DATA TRANSLATION

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DT3130 Series
User's Manual

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Radio and Television Interference

This equipment has been tested and found to comply with CISPR EN55022 Class A and EN50082-1 (CE) requirements and also with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Changes or modifications to this equipment not expressly approved by Data Translation could void your authority to operate the equipment under Part 15 of the FCC Rules.

Note: This product was FCC-Certified under test conditions that included use of shielded cables and connectors between system components. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radio, television, and other electronic devices.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

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About this Manual

This manual describes the features of the DT3131, DT3131-ISO, DT3132, DT3132-ISO, DT3133, and DT3133-ISO frame grabber boards (collectively referred to as the DT3130 Series), and how to use the DT3130 Series Device Driver with the DT-Open Layers™ Frame Grabber SDK™ to write an application program.

Intended Audience

This document is intended for engineers, scientists, technicians, or others responsible for programming and/or using a DT3130 Series board to perform machine vision and/or image analysis operations. It is assumed that you have some familiarity with imaging principles and that you are familiar with the operating characteristics of your video source.

If you are writing application programs using the device driver and the Frame Grabber SDK, it is also assumed that you are familiar with the Microsoft® Windows® 98, Windows Me (Millennium Edition), Windows 2000, or Windows XP operating system and with the Microsoft C compiler.

What You Should Learn from this Manual

This manual provides detailed information about the features of the DT3130 Series boards and the DT3130 Series Device Driver to allow you to access the boards' capabilities using software. It is organized as follows:

- Chapter 1, "Overview," describes the major features of the boards, as well as the supported software and accessories for the boards.

- Chapter 2, "Principles of Operation," describes all of the features of the boards and how to use them in your application.
- Chapter 3, "Supported Device Driver Capabilities," describes the capabilities supported by the DT3130 Series Device Driver and the initialized control values.
- Chapter 4, "Programming Flowcharts," describes the processes you must follow to program the DT3130 Series boards using the DT-Open Layers Frame Grabber SDK and Color SDK Extensions.
- Chapter 5, "Troubleshooting," provides information that you can use to resolve problems with the boards and the device driver, should they occur.
- Appendix A, "Specifications," lists the specifications of the boards.
- Appendix B, "Connector Pin Assignments," shows the pin assignments for the connectors on the boards.
- Appendix C, "Modifying the Device Driver," describes how to add, modify, and remove a board from the device driver configuration, and uninstall the device driver, if necessary.
- An index complete this manual.

Conventions Used in this Manual

The following conventions are used in this manual:

- Notes provide useful information that requires special emphasis, cautions provide information to help you avoid losing data or damaging your equipment, and warnings provide information to help you avoid catastrophic damage to yourself or your equipment.
- Items that you select or type are shown in **bold**.
- `Courier font` is used to represent source code.

Related Information

Refer to the following documents for more information on using the DT3130 Series boards:

- *DT3130 Series Getting Started Manual* (UM-17316), included on the Imaging OMNI CD™ provided with the DT3130 Series boards, describes how to install the DT3130 Series software, install a DT3130 Series board, connect signals to the board, install and configure the DT3130 Series Device Driver, verify the board's operation with DT-Acquire, and view the DT3130 Series manuals online.
- *Frame Grabber SDK User's Manual* (UM-13442) and online help, included on the Imaging OMNI CD provided with the DT3130 Series boards, describes the Dynamic Linkable Library (DLL) that you can use to write image acquisition application software.
- *DT-Active Open Layers User's Manual* (UM-17325), available from Data Translation, describes DT-Active Open Layers™, an ActiveX control, which allows you to use Data Translation PCI frame grabber boards within graphical programming environments such as Microsoft Visual Basic® and Visual C++®.
- *GLOBAL LAB Image/2 User's Manual* (UM-17790) and *GLOBAL LAB Image/2 API Manual* (UM-17792), available from Data Translation, describe how to use GLOBAL LAB® Image/2 and GLOBAL LAB Image/2 Streamline™ to create scientific applications using object-oriented image processing tools.
- *DT Vision Foundry User's Manual* (UM-17755) and *DT Vision Foundry API Manual* (UM-17757), available from Data Translation, describe how to use DT Vision Foundry™ to create machine vision applications using object-oriented image processing tools.
- *PCI Specification:* PCI Local Bus Specification, PCI Special Interest Group, Hillsboro, OR., Revision 2.1s, (503) 696-2000.
- Bt254 Monolithic CMOS Triple 8-bit Image Digitizer, Brooktree Corporation, (619) 452-7580.

- SAA7116 Digital Video to PCI Interface, Philips Semiconductors, (800) 234-7381.

Additionally, it may be helpful to read other material to gain a better understanding of image processing concepts, algorithms, and their applications. Data Translation's Technical Support Department recommends the following resources for understanding image processing concepts, processing, and coding:

Baxes, Gregory A. *Digital Image Processing, Principles & Applications.* New York: John Wiley & Sons, 1994. Introduction to image processing and hardware/software basics.

Benson, K. Blair, and Donald G. Fink. *HDTV Advanced TV for the 1990's.* New York: McGraw-Hill, 1990. Details high-definition television concepts.

Brooktree Corporation. *Brooktree Applications Handbook - Graphics and Imaging Products.* San Diego: Brooktree Corporation, 1991. Product data book and application examples.

Castleman, K. R. *Digital Image Processing*. Englewood Cliffs, NJ: Prentice-Hall, 1987. Explains major image processing concepts and mathematical concepts involved in digital image manipulation.

Cunningham, John E. *Cable TV*. 2nd ed. Indianapolis: Howard W. Sams & Company, Inc., 1987. Provides the basics of cable television.

Foley, J. D., and A. Van Dam. *Fundamentals of Interactive Computer Graphics*. Addison-Wesley: Reading, MA, 1984. Provides information on geometric functions.

Friedhoff, Richard M., and William Benzon. *The Second Computer Revolution, Visualization.* New York: Harry N. Abrams, Inc., 1989. Covers the history of image processing technology.

Gonzalez, Rafael C., and Paul Wintz. *Digital Image Processing.* Menlo Park, CA: Addison-Wesley, 1987. Explains major image processing concepts and mathematical concepts involved in digital image manipulation, including FFT processing, filtering operations, geometric functions, histograms, and linear equalization.

Held, Gilbert. *Data Compression Techniques and Applications: Hardware and Software Considerations.* 3rd ed. Somerset, NJ: John Wiley & Sons, Inc., 1991. Covers various techniques currently used for data compression; includes programming examples.

Holzmann, Gerard J. *Beyond Photography - The Digital Darkroom.* Englewood Cliffs, NJ: Prentice-Hall, 1988. Introduces and explains image editing; includes programming examples.

Ingram, Dave. *Video Electronics Technology.* Blue Ridge Summit, PA: Tab Books, Inc., 1984. Explains the basic electronics used in video devices.

Kiver, M. S. *Color Television Fundamentals.* New York: McGraw-Hill, 1977. Covers television and video basics.

Lindley, Craig. *Practical Image Processing in C.* Somerset, NJ: John Wiley & Sons, Inc., 1991. Explains basic image processing techniques using C, provides many programming examples, covers TIFF and PICT file formats, and describes how to map images into VGA memory space.

Luther, Arch C. *Digital Video in the PC Environment.* New York: McGraw-Hill, 1991. Explains Digital Video Interactive (DVI) technology.

National Semiconductor Corporation. *Linear Applications Handbook.* Santa Clara, CA: National Semiconductor Corporation, 1986. Explains broadcasting standards and major circuit components of frame grabber boards.

Pratt, William K. *Digital Image Processing.* Somerset, NJ: John Wiley & Sons, Inc., 1991. Detailed text on image processing, including morphological processing, feature extraction, image segmentation, and shape analysis.

Reid, Christopher E. and Thomas B. Passin. *Signal Processing in C.* Somerset, NJ: John Wiley & Sons, Inc.

Rimmer, Steve. *Bit-Mapped Graphics.* Blue Ridge Summit, PA: Tab Books, Inc., 1990. Details digital image file formats and image manipulation after digitizing.

Rimmer, Steve. *Graphical User Interface Programming.* Blue Ridge Summit, PA: Tab Books, Inc., 1992. Covers various techniques currently used for GUI programming; gives insight into how Microsoft Windows was written/implemented along with the design aspects related to windows programming; includes programming examples.

Rosenfeld, Azriel, and Avinash C. Kak. *Digital Picture Processing.* New York: Academic Press, Inc., 1990. Describes image processing techniques and concepts.

Russ, John C. *Computer-Assisted Microscopy,* The Measurement and Analysis of Images. New York: Plenum Press.

Serra, J. *Image Analysis and Mathematical Morphology.* London: Academic Press, Ltd., 1982. Provides information on morphological processing.

Smith, C. Cecil. *Mastering Television Technology.* Richardson, TX: Newman Smith Publishing Company, Inc., 1988. Describes current video technology and concepts.

Tektronix, Inc. *Television Measurements - NTSC Systems.* Beaverton, OR: Tektronix, Inc., 1989. Covers test equipment and broadcasting standards.

Ulichney, Robert. *Digital Halftoning*. Cambridge, MA: The MIT Press, 1987. Describes image manipulation, creation, and analysis in the digital environment.

Watkinson, John. *The Art of Digital Video.* Stoneham, MA: Focal Press, 1990. Provides an in-depth description of digital video fundamentals.

Where to Get Help

Should you run into problems installing or using a DT3130 Series board, the Data Translation Technical Support Department is available to provide technical assistance. Refer to Chapter 5 for more information. If you are outside the United States or Canada, call your local distributor, whose number is listed in your Data Translation product handbook.

Overview

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Features

The DT3130 Series provides low-cost, color frame grabber boards for the PCI bus. These boards are suitable for both color image analysis and machine vision applications.

Each DT3130 Series board digitizes the image, then either stores the digitized data to the host computer's system memory or transfers the digitized data to the computer's display controller to display images in real-time. The boards transfer image data to the host computer using PCI burst transfers.

Key features of the DT3130 Series boards are summarized as follows:

- Operate as PCI bus masters on half-size boards.
- Support the scatter/gather memory capability using the PCI interface chip.
- Support the following video inputs and formats:

Board Type	Video Inputs	Video Formats
DT3131 and DT3131-ISO	3 composite (CVBS)	NTSC/RS-170 or PAL/CCIR
	2 composite and 1 S-video	Composite uses NTSC/RS-170 or PAL/CCIR; S-Video uses Y/C
DT3132 and DT3132-ISO	6 composite	NTSC/RS-170 or PAL/CCIR
	4 composite and 2 S-video	Composite uses NTSC/RS-170 or PAL/CCIR; S-Video uses Y/C
DT3133 and DT3133-ISO	9 composite	NTSC/RS-170 or PAL/CCIR
	6 composite and 3 S-video	Composite uses NTSC/RS-170 or PAL/CCIR; S-Video uses Y/C

- Process 1, 2, or 3 active video signals at a time, as follows:

Board Type	Number of Active Video Signals
DT3131 and DT3131-ISO	1
DT3132 and DT3132-ISO	2
DT3133 and DT3133-ISO	3

- Support external, high-speed trigger inputs and strobe outputs as follows:

Board Type	Number of Trigger Inputs[a]	Number of Strobe Outputs[b]
DT3131 and DT3131-ISO[c]	**1**	**1**
DT3132 and DT3132-ISO[c]	**2**	**2**
DT3133 and DT3133-ISO[c]	**3**	**3**

a. The trigger polarity is user-programmable.
b. The strobe pulse width is user-programmable from 3.3 ms to 426.6 ms.
c. The trigger inputs and strobe outputs are isolated on the DT3131-ISO, DT3132-ISO, and DT3133-ISO boards.

- Acquire single or multiple fields and/or frames synchronously or asynchronously.

- Store images in either 32-bit RGB, 16-bit RGB, 15-bit RGB, 16-bit YUYV422, or 8-bit monochrome format.
- Support programmable region-of-interest (ROI).
- Provide real-time, interpolated scaling to any size.
- Provide programmable control of the color settings of the board, including brightness, contrast, saturation, and hue.
- Provide connection for +12 V camera power.
- Support overlays.

Supported Software

The following software is available for use with a DT3130 Series board:

- **DT3130 Series Device Driver** –This software, which is operating-system specific, is provided on the Imaging OMNI CD, which is shipped with the board. You *must* install this device driver to use a DT3130 Series board with any of the supported software packages or utilities. Refer to the *DT3130 Series Getting Started Manual* (UM-17316) for information on installing the device driver.
- **DT-Acquire** –This software is provided on the Imaging OMNI CD, which is shipped with the board. This utility allows you to verify the operation of your board during startup. Refer to the *DT3130 Series Getting Started Manual* (UM-17316) for information on installing and using this utility.
- **32-Bit Frame Grabber SDK** –This software is provided on the Imaging OMNI CD, which is shipped with the board. The Frame Grabber SDK software is provided for those who want to develop their own application software for the DT3130 Series board using the Microsoft C compiler in Windows 98, Windows Me, Windows 2000, or Windows XP.
- **DT-Active Open Layers** –Order this optional software package if you want to use the DT-Active Open Layers ActiveX control to access the capabilities of the DT3130 Series boards using Microsoft Visual Basic or Visual C++.
- **GLOBAL LAB Image/2** –Order this optional software package if you want to develop scientific applications using object-oriented image processing tools.

- **DT Vision Foundry** –Order this optional software package if you want to develop machine vision applications using object-oriented image processing tools

Refer to the Data Translation catalog for information on additional software packages available for the DT3130 Series boards.

Accessories

The following accessories are available for the DT3130 Series boards:

- **EP311 cable** –A 2-foot cable with a 15-pin, D-shell connector on one end that connects to connector J2 on the DT3130 Series boards and three BNC connectors on the other end. The EP311 cable connects one composite input (VID0) to the DT3131 and DT3131-ISO board, two composite inputs (VID0 and VID3) to the DT3132 and DT3132-ISO boards, and three composite inputs (VID0, VID3, and VID6) to the DT3133 and DT3133-ISO boards. Refer to Appendix B for connector pin assignments.
- **EP312 cable** –A 3-foot cable with a 15-pin, D-shell connector on one end and four 9-pin connectors (containing AWG, twisted-pair wires) on the other end. The EP312 cable accommodates all the control signals from the J1 connector on a DT3130 Series board. Refer to Appendix B for connector pin assignments.
- **EP314 cable** –A 2-foot cable with a 15-pin, D-shell connector on one end and nine BNC connectors on the other end. The EP314 cable connects up to nine composite inputs (VID0 to VID8) to connector J2 on the DT3130 Series boards. Refer to Appendix B for connector pin assignments.
- **EP315 cable** –A 1-foot cable with two 4-pin connectors, and one 2-pin connector. The EP315 cable allows the DT3130 Series board to provide +12 V power (1.5 A) for a camera. Refer to Appendix B for connector pin assignments.
- **EP317 cable** –A 6-foot cable with one 15-pin, D-shell connector on one end and one S-video connector on the other end. The EP317 cable allows you to connect one S-video input (Y1/C1) to a DT3130 Series board. Refer to Appendix B for connector pin assignments.

2

Principles of Operation

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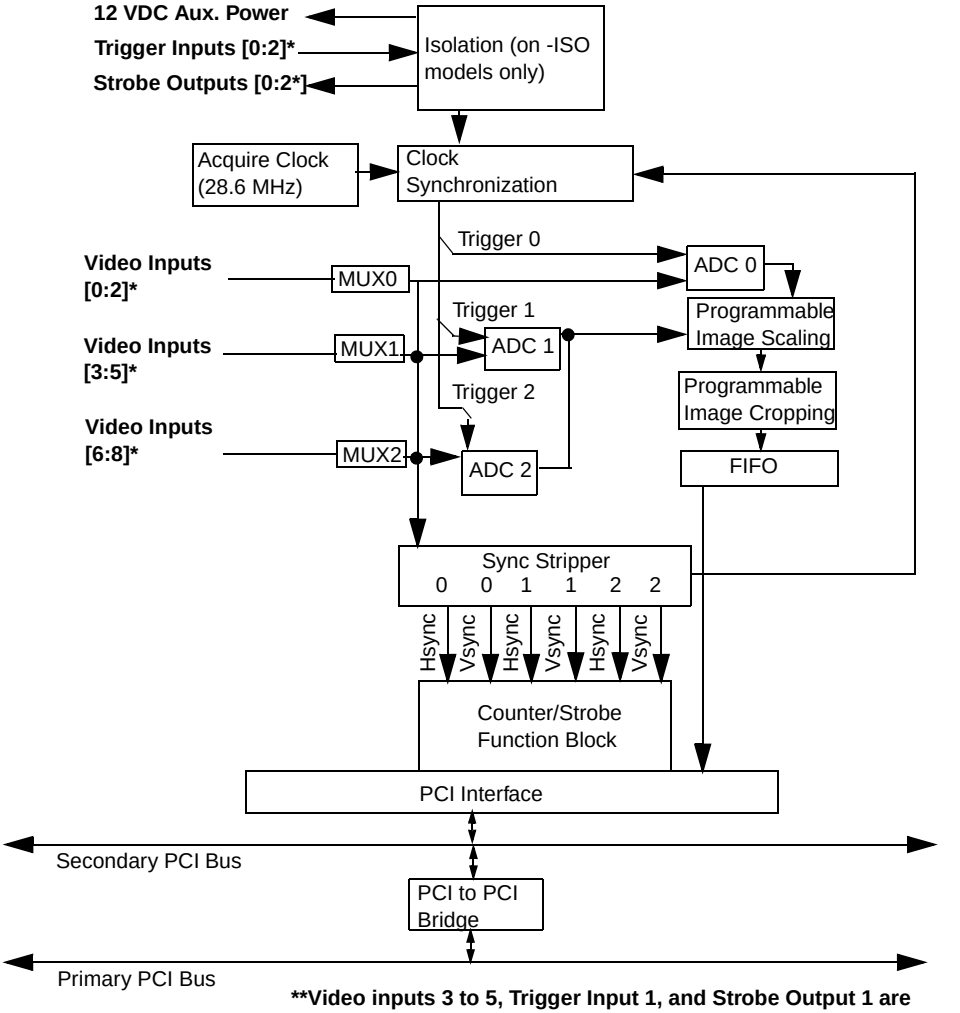
To aid the discussions in this chapter, refer to the block diagram of a DT3130 Series board, shown in Figure 1. Bold signal names indicate signals you can access.



****Video inputs 3 to 5, Trigger Input 1, and Strobe Output 1 are supported on the DT3132, DT3132-ISO, DT3133, and DT3133-ISO boards only. Video inputs 6 to 8, Trigger Input 2, and Strobe Output 2 are supported on the DT3133 and DT3133-ISO boards**

Figure 1: DT3130 Series Block Diagram

Video Input Signals

This section describes the following aspects of the supported input signals:

- Video signal types,
- Video formats,
- Video input channels,
- Color controls,
- Pixel clock, and
- External trigger.

Video Signal Types

The DT3130 Series can acquire images from the following signal types:

- **Monochrome** –Data is represented as 8-bit grayscale values.
- **Composite (CVBS**) –The Color Video Broadcast Standard, where both luminance and chrominance information is encoded on a single composite video signal. The signal passes through high- and low-pass filters on the board to separate the chrominance and luminance signals. The decoded signals are represented as 8-bit data.
- **S-Video** –This signal contains both luminance and chrominance information. The filters on the board are bypassed. S-video signals are generally "cleaner," since the high- and low-pass filters can sacrifice signal integrity.

The following video formats are supported for monochrome and composite inputs:

- NTSC –Standard for 60 Hz, color video signals. In this format, the video input is a single analog signal. A video frame is displayed as 640 x 480 lines.
- RS-170 –Standard for 60 Hz, monochrome video signals. In this format, the video input is a single analog signal. A video frame is displayed as 640 x 480 lines.
- PAL –Standard for 50 Hz, color video signals. In this format, the video input is a single analog signal. A video frame is displayed as 768 x 576 lines.
- CCIR –Standard for 50 Hz, monochrome video signals. In this format, the video input is a single analog signal. A video frame is displayed as 768 x 576 lines.

The Y/C format is supported for S-video inputs. In this format, the video input is provided as two separate analog signals. The Y signal contains luminance information (the gray-scale portion of the color image). The C signal contains chrominance information (the color portion of the image). For 60 Hz, a video frame is displayed as 640 x 480 lines. For 50 Hz, a video frame is displayed as 768 x 576 lines.

Videos Input Channels

DT3130 Series boards provide monochrome, composite (CVSB), and S-video input sources. Table 1 lists the number of video input channels supported by each board as well as how to connect these input channels to the board.

Table 1: Video Inputs and Connections

Board Type	Video Inputs	Connections
DT3131 and DT3131-ISO	3 monochrome or composite inputs	Connect to the VID0, VID1, and/or VID2 inputs of connector J2.
	1 S-video input and 2 monochrome or composite inputs[a]	For S-video inputs, connect the Y signal to the Y0 input of connector J2; connect the C signal to the C0 input of connector J2. For monochrome or composite inputs, connect to the VID0 and/or VID1 inputs of connector J2.
DT3132 and DT3132-ISO	6 monochrome or composite inputs	Connect to the VID0, VID1, VID2, VID3, VID4, VID5, and/or VID6 inputs of connector J2.
	2 S-video inputs and 4 monochrome or composite inputs[a]	For S-video inputs, connect the Y signals to the Y0 and/or Y1 inputs of connector J2; connect the C signals to the C0 and/or C1 inputs of connector J2. For monochrome or composite inputs, connect to the VID0, VID1, VID3 and/or VID4 inputs of connector J2.

Table 1: Video Inputs and Connections

Board Type	Video Inputs	Connections
DT3133 and DT3133-ISO	9 monochrome or composite inputs	For monochrome or composite signals, connect to the VID0, VID1, VID2, VID3, VID4, VID5, VID6, VID7, VID8, and/or VID9 inputs of connector J2.
	3 S-video inputs and 6 monochrome or composite inputs[a]	For S-video inputs, connect the Y signals to the Y0, Y1, and/or Y2 inputs of connector J2; connect the C signals to the C0, C1, and/or C2 inputs of connector J2. For monochrome or composite inputs, connect to the VID0, VID1, VID3, VID4, VID6, and/or VID7 input of connector J2.

a. Currently, Data Translation does not supply a cable that supports more than one S-video input or an S-video input and monochrome/composite inputs together. If you need more than one S-video input or S-video and monochrome/composite inputs, you must design your own cable.

In software, each group of three input channels is called a device. The DT3131 and DT3131-ISO boards provide one device (device 1), the DT3132 and DT3132-ISO boards provide two devices (devices 1 and 2), and the DT3133 and DT3133-ISO boards provide three devices (devices 1, 2, and 3).

When you configure the device driver for the board, you specify the name (alias) of the board. The device numbers for that board are then appended to the alias. For example, if you named the DT3133 board *MY3133*, the alias for the first device is MY3133-1, the alias for the second device is MY3133-2, and the alias for the third device is MY3133-3. Table 2 summarizes how the software handles the input channel numbering.

Table 2: Device Numbers and Input Channels

Device Number	Physical Channel Number	Software Channel Number
1	Monochrome or Composite Input 0	0
	Monochrome or Composite Input 1	1
	Monochrome or Composite Input 2 or S-Video Input Y0	2
2	Monochrome or Composite Input 3[a]	0
	Monochrome or Composite Input 4[a]	1
	Monochrome or Composite Input 5 or S-Video Input Y1[a]	2
3	Monochrome or Composite Input 6[b]	0
	Monochrome or Composite Input 7[b]	1
	Monochrome or Composite Input 8 or S-Video Input Y2[b]	2

a. Provided on the DT3132, DT3132-ISO, DT3133, and DT3133-ISO boards only.

b. Provided on the DT3133 and DT3133-ISO boards only.

Color Intensity

Using software, you can adjust the following settings of a DT3130 Series board to affect the intensity of the color:

- **Brightness** –The value associated with a pixel representing its gray value. Values range from 0 to 255 (in increments of 1); the nominal value is 128.
- **Contrast** –The overall range of the monochrome signal of an image. For example, a high contrast image has a large range between black and white values; a low contrast image has a small range between black and white values. Values range from 0 to 255 (in increments of 1); the nominal value is 216.
- **V-Saturation** –The purity of the blue and green primary colors in an image. For example, if a particular pixel has a value of 0 for green, but a value of 256 for blue, then the pixel is said to be saturated in blue. Values range from 0 to 255 (in increments of 1); the nominal value is 180.
- **U-Saturation** –The purity of the green and red primary colors in an image. For example, if a particular pixel has a value of 0 for green, but a value of 256 for red, then the pixel is said to be saturated in red. Values range from 0 to 255 (in increments of 1); the nominal value is 254.
- **Hue** –The intensity or shade of the color. Values range from 0 to 255 (in increments of 1); the nominal value is 128.

Pixel Clock

DT3130 Series boards generate a 12.5 MHz pixel clock signal for 60 Hz image formats and a 15 MHz pixel clock signal for 50 Hz image formats. Pixels are available to a DT3130 Series frame grabber board in increments of *PixelPeriod*, which is equal to 1 /clock frequency.

Triggers

DT3130 Series boards provide the following trigger sources:

- **A software trigger** –The board can acquire a frame when a software command is issued.
- **An external trigger** –By attaching a digital signal to an external trigger input on the board, you can synchronize frame acquisitions with external events.

You program the trigger source for the acquisition using software.

Table 3 shows the connectors on the EP312 cable provided for connecting external trigger inputs to a DT3130 Series board.

Table 3: External Trigger Inputs

Board	Device Number on Board	External Trigger Input Signals	EP312 Connector	EP312 Pin Number
DT3131 and DT3131-ISO	1	Trigger 0+	J5	1
		Trigger 0–		6
DT3132 and DT3132-ISO	1	Trigger 0+	J5	1
		Trigger 0–		6
	2	Trigger 1+	J5	2
		Trigger 1–		7
DT3133 and DT3133-ISO	1	Trigger 0+	J5	1
		Trigger 0–		6
	2	Trigger 1+	J5	2
		Trigger 1–		7
	3	Trigger 2+	J5	3
		Trigger 2–		8

By default, the external trigger is disabled. Through software, you can enable the external trigger.

For the DT3131, DT3132, and DT3133 boards, you can specify whether to start image acquisition when the board detects either a low-to-high edge (rising-edge) transition or a high-to-low edge (falling-edge) transition.

For the DT3131-ISO, DT3132-ISO, and DT3133-ISO boards, you can specify whether to start image acquisition when the board detects either a low-to-high (high level) transition or a high-to-low (low level) transition on the Trigger+ input pin as referenced to the Trigger–input pin. The difference between Trigger+ and Trigger– must be greater than 0.8 V for the signal to be considered a high level.

The incoming external trigger is qualified to be within a programmable window and is forwarded to the device driver as an interrupt. The interrupt is processed by the device driver to start the acquisition and trigger the strobe, if desired. Refer to page 20 for more information on strobing.

Notes: Each device on the board requires its own interrupt resource.

Sync Signals

To digitize the incoming video signal, the DT3130 Series board requires both horizontal and vertical sync signals. The board determines this information, as well as the odd and even fields, from the video input signal being digitized.

Horizontal sync pulses are asserted low for 4 µs typically. Vertical sync pulses are asserted low for 230 µs typically. The odd field indication changes state on the falling edge of the vertical sync signal.

Strobe Output Signals

You can generate one or more strobe output pulses from a DT3130 Series board. Table 4 describes the connectors and pins on the EP312 cable that are provided for connecting strobe output signals to a DT3130 Series board.

Table 4: Strobe Output SIgnals

Board	Device Number on Board	Strobe Output Signals	EP312 Connector	EP312 Pin Number
DT3131 and DT3131-ISO	1	Strobe 0+	J2	5
		Strobe 0–		4
DT3132 and DT3132-ISO	1	Strobe 0+	J2	5
		Strobe 0–		4
	2	Strobe 1+	J3	5
		Strobe 1–		4
DT3133 and DT3133-ISO	1	Strobe 0+	J2	5
		Strobe 0–		4
	2	Strobe 1+	J3	5
		Strobe 1–		4
	3	Strobe 2+	J4	5
		Strobe 2–		4

A DT3130 Series board can perform either a conditional strobe, where the strobe is qualified by the frame/field position, or an unconditional strobe, where the strobe is not qualified by the frame/field position. These strobe types are described in more detail in the following sections.

Conditional Strobe

To perform a conditional strobe, use software to set up the board to output a strobe signal on one of the following conditions:

- After the specified field has been acquired. Set the strobe type to field. For example, if you set your strobe type to field and your acquisition frame type to even field, the strobe signal will be output after each even field is acquired. Refer to page 29 for more information on specifying a frame type for acquisition.
- After each frame has been acquired. Set the strobe type to frame.

Using software, you can also specify the following parameters for a conditional strobe:

- The length of the strobe output pulse (3.3 ms, 6.6 ms, 13 ms, 26.6 ms, 53.3 ms, 106.6 ms, 213.3 ms, or 426.6 ms).
- The polarity of the strobe output signal as active high or active low.

  For DT3131, DT3132, and DT3133 boards, selecting an active-high polarity means that the strobe output pulse is a low-to-high going signal; selecting an active-low polarity means that the strobe output pulse is a high-to-low going signal.

  For DT3131-ISO, DT3132-ISO, or DT3133-ISO boards, the strobe outputs act like a momentary switch. Selecting an active-high polarity means that the strobe outputs are normally open; they close only for the duration of the strobe pulse width. Selecting an active-low polarity means that the strobe outputs are normally closed; they open only for the duration of the strobe pulse width.

  Figure 2 shows how the polarity works with each board type. You must wire your strobe output signal accordingly.

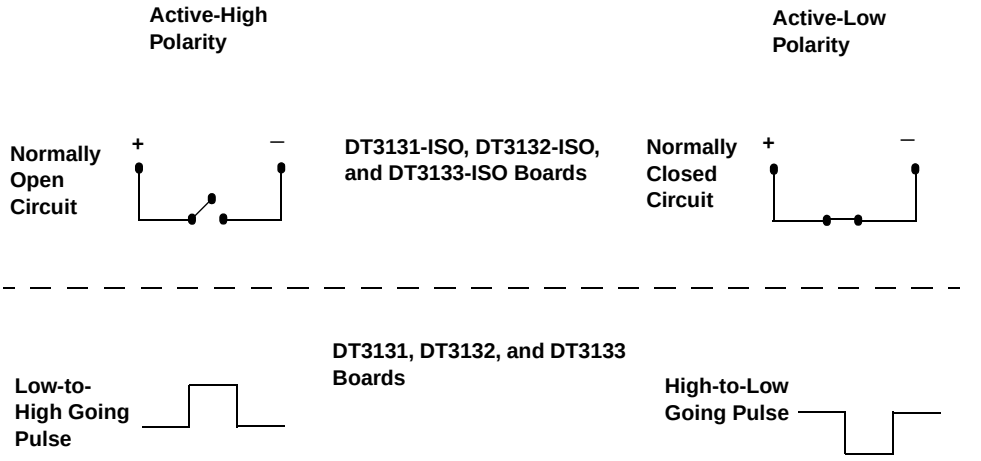


Figure 2: Strobe Polarity

Unconditional Strobe

To perform an unconditional strobe, use software to set up the board to output a strobe signal regardless of the field or frame being acquired (strobe now). Then, when you execute a software command, the strobe signal is output.

Using software, you can specify the following parameters for an unconditional strobe:

- The length of the strobe output pulse (3.3 ms, 6.6 ms, 13 ms, 26.6 ms, 53.3 ms, 106.6 ms, 213.3 ms, or 426.6 ms.
- The polarity of the strobe output signal as active high or active low.
- The polarity of the strobe output signal as active high or active low.

For DT3131, DT3132, and DT3133 boards, selecting an active-high polarity means that the strobe output pulse is a low-to-high going signal; selecting an active-low polarity means that the strobe output pulse is a high-to-low going signal.

For DT3131-ISO, DT3132-ISO, or DT3133-ISO boards, the strobe outputs act like a momentary switch. Selecting an active-high polarity means that the strobe outputs are normally open; they close only for the duration of the strobe pulse width. Selecting an active-low polarity means that the strobe outputs are normally closed; they open only for the duration of the strobe pulse width.

Figure 2 on page 22 shows how the polarity works with each board type. You must wire your strobe output signal accordingly.

Video Area

The total video area is a complete set of horizontal and vertical input lines from which you extract the active video area and the frame within the active video area. The total video area includes all parts of the signal, including nonvisual portions such as horizontal and vertical blanking information. (Blanking information is the data not included in the active video area; it contains sync and other information.)

The total video area is as wide as the total pixels per line (the entire area between two consecutive horizontal sync signals) and as tall as the total lines per field (the entire area between two consecutive vertical sync signals).

You can calculate the total pixels per line as follows:

$$\text{Total pixels per line} = \frac{\text{pixel clock frequency (MHz)}}{\text{horizontal frequency (kHz)}}$$

You can calculate the total lines per field as follows:

$$\text{Total lines per field} = \frac{\text{horizontal frequency (kHz)}}{\text{vertical frequency (Hz)}}$$

Active Video Area

The active video area floats in the total video area. The active video area is defined as that part of the incoming signal that contains valid video data (not blanking or sync information). Therefore, the active video area consists of the visible portion of those lines containing visible pixel data. Its top is set by the first active line, its left side is set by the first active pixel, it is as wide as the active pixel count, and it is as tall as the active line count.

For more information about the horizontal and vertical signals that comprise the total video area and the parameters you can set to specify the active video area, refer to the following sections.

Horizontal Video Signal

Each line of video comprising the total video area contains blanking information and active video. Figure 3 shows the components of a single horizontal line of video.

Note that the frame is an area that you establish within the active video area. For information about the frame, refer to page 27.

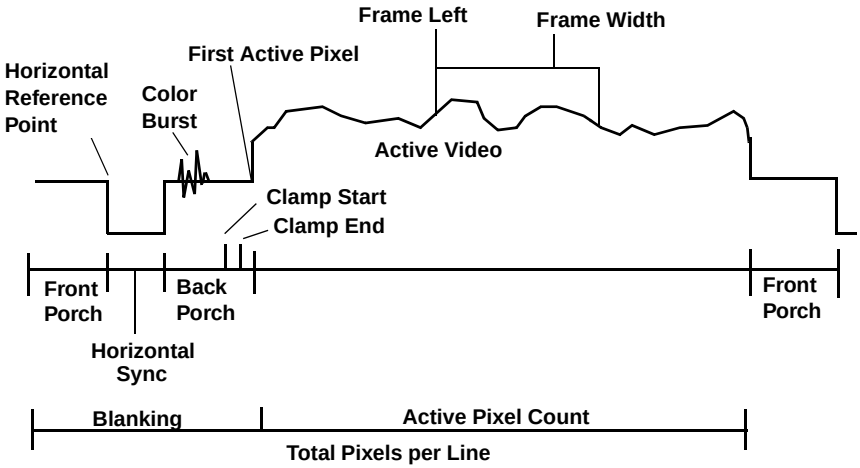


Figure 3: Horizontal Video Signal

A horizontal line of video is identified by the falling edge of the horizontal sync, and a field is composed of a collection of horizontal lines defined by the active line count. Pixel measurements are relative to the horizontal reference point, which is defined as the beginning of the horizontal sync.

The settings for the horizontal video signal are fixed.

Vertical Video Signal

Each field of video also contains blanking information and lines of active video. Figure 4 shows the components of a single vertical field of noninterlaced video.

Note that the frame is an area that you establish within the active video area. For information about the frame, refer to page 27.

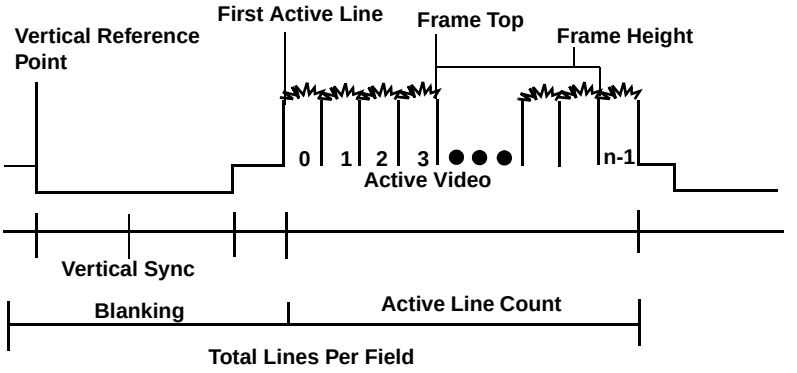


Figure 4: Vertical Video Signal

Line measurements are relative to the vertical reference point, which is defined as the beginning of the vertical sync. Lines themselves are measured in terms of pixels.

The settings for the vertical video signal are fixed.

Frame (Region of Interest)

The frame is the portion of the active video area that you want to digitize. For this reason, it is sometimes called the region of interest (ROI).

This section describes the following aspects of frames:

- Frame size,
- Frame type,
- Scaling frames, and
- Frame storage modes.

Frame Size

The top of the frame is the first line of video relative to the active video area. The left side of the frame is the first pixel of video relative to the active video area. The width of the frame is the number of pixels per line of video. The height of the frame is the number of lines per field.

Table 5 shows the settings you can program on DT3130 Series boards to define the frame. Figure 5 illustrates these relationships.

Table 5: Frame Settings for DT3130 Series Boards

Setting	Description	Range[a]	Nominal Values
Frame Left	The first pixel in the region of interest, relative to the first active pixel, to digitize.	50 Hz: 0 to 763 pixels 60 Hz: 0 to 635 pixels	0
Frame Width	The number of pixels per line of video to digitize.	50 Hz: 1 to 768 pixels 60 Hz: 1 to 640 pixels	50 Hz: 768 60 Hz: 640
Frame Top	The first line of the region of interest, relative to the first active line, to digitize.	50 Hz: 0 to 575 lines 60 Hz: 0 to 479 lines[a]	0
Frame Height	The number of lines per frame of video to digitize.	50 Hz: 1 to 576 lines 60 Hz: 1 to 480 lines	50 Hz: 576 60 Hz: 480

a. Granularity is 1.

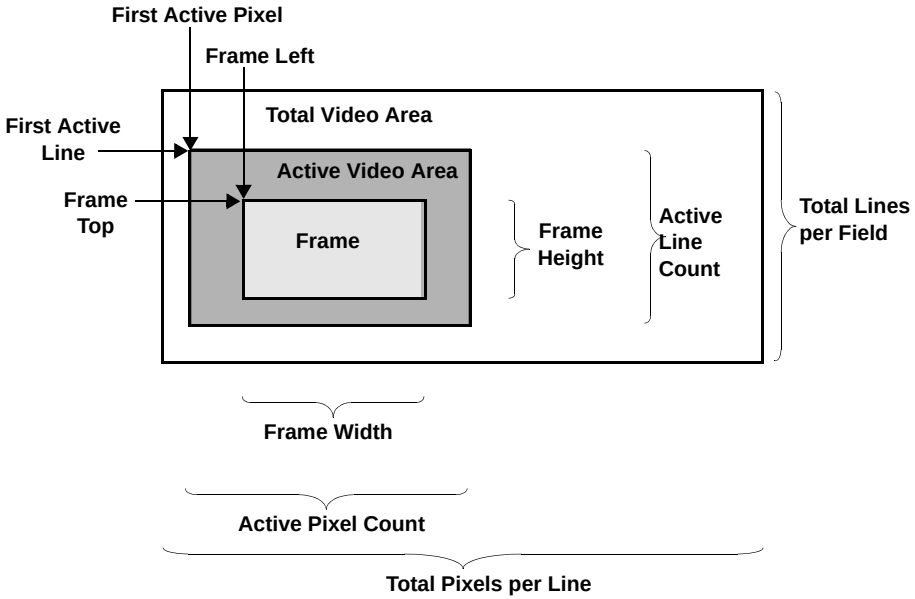


Figure 5: Spatial Relationship of Video Signal

Types of Frames

DT3130 Series boards can acquire interlaced frames.

The video signal is defined as two consecutive fields, where the start of each field is identified by the falling edge of the vertical sync. These two fields are acquired to create the complete frame. The even field contains lines 0, 2, 4, and so on; the odd field contains lines 1, 3, 5, and so on.

Using software, you can select one of the following types of frame acquisitions:

- Interlaced frames, starting on the next even field (the default),
- Interlaced frames, starting on the next odd field,
- Interlaced frames, starting on the next field (odd or even),
- Even fields only, starting with the next even field,
- Odd field only, starting with the next odd field, or
- Odd or even fields only, starting with the next field of either kind. For example, if the next field is odd, only the odd fields are acquired. If the next field is even, only the even fields are acquired.

Scaling Frames

DT3130 Series boards can perform simultaneous, interpolated, arbitrary scaling in real-time. This feature is useful if you want to reduce the size of an image.

The number of lines per frame in the scaled image can range from 1 to 480 for 60 Hz image formats or from 1 to 576 for 50 Hz image formats (in increments of 1). The number of pixels per line in the scaled image can range from 1 to 640 for 60 Hz image formats or from 1 to 768 for 50 Hz image formats (in increments of 1).

Using software, you provide the scale factor for the horizontal and vertical directions. The scale factor is the ratio of the target values (the total number of pixels or lines in the resulting scaled image) to the source values (the total number of pixels or lines in the image to scale) in each direction.

The minimum scale factor is 1; the maximum scale factor is 100 (nominal is 100).

Frame Storage Mode

You can store the data in one of the following formats:

- Monochrome format (8-bits per pixel), as shown in Figure 6;
- RGB15 (15-bits per pixel) or RGB16 (16-bits per pixel), as shown in Figure 7;
- RGB24 (24-bits per pixel), as shown in Figure 8; and
- RGB (32-bits per pixel), as shown in Figure 9; and
- YUYV422 (16-bits per pixel), as shown in Figure 10.

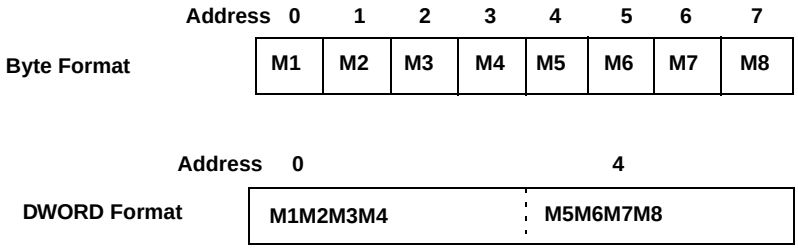


Figure 6: Monochrome Mode (8-Bit Data Format)

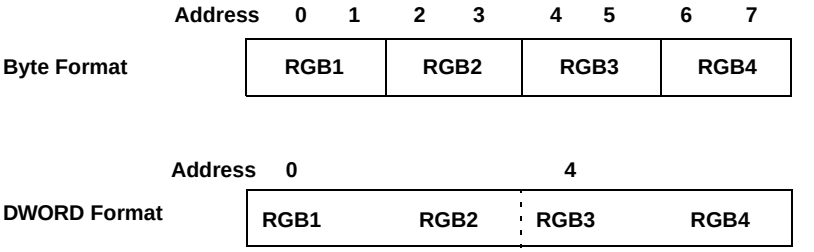


Figure 7: RGB15 (15-Bit) and RGB16 (16-Bit) Color Data Format

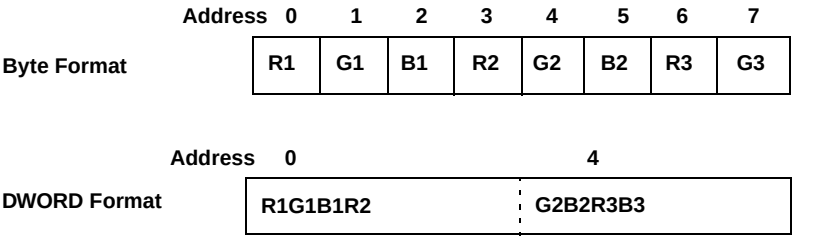


Figure 8: RGB 24-Bit Color Data Format

Figure 9: RGB 32-Bit Color Data Format

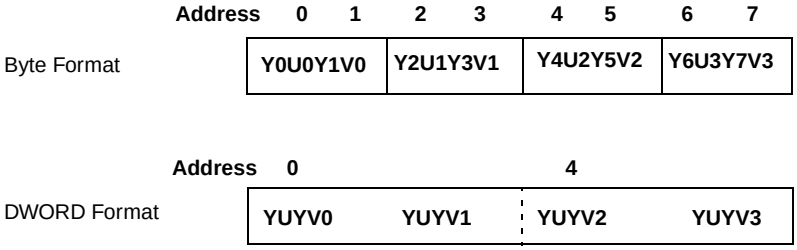


Figure 10: YUYV422 (16-Bit) Data Format

Passthru Operations

In a passthru operation, a DT3130 Series board continuously captures and displays video data until you stop the operation. Typically, you use passthru to view images (in as close to real time as possible for the configuration and passthru method chosen) for the purpose of focusing or positioning the camera.

In addition to displaying passthru data, you can continuously store the data to user-allocated buffers in host memory, if desired. This operation is called continuous-acquire passthru mode.

This section describes the following aspects of passthru:

- Passthru modes,
- Source origin, and
- Overlays

Passthru Modes

DT3130 Series boards support bitmap passthru mode and continuous-acquire passthru mode. This section describes these modes.

Bitmap Passthru Mode

DT3130 Series boards support asynchronous bitmap passthru mode.

In an asynchronous operation, the operation starts but gives control to you immediately, allowing you to perform other operations while data is displayed.

Bitmap passthru mode requires a frame in device memory into which the image is captured.

Once the image is captured, functions in Windows perform bit copies of the image data to display memory. Functions in Windows handle obstructions to the passthru window by automatically clipping the passthru image to the visible client window region. Therefore, even if the window is obstructed in bitmap mode, the passthru can continue unabated. Once an obstruction has been removed from the passthru window client area, Windows automatically restores the correct underlying image data.

A passthru operation continues until you stop it. You can stop an asynchronous bitmap passthru operation using software.

Continuous-Acquire Passthru Mode

DT3130 Series boards support asynchronous, continuous-acquire passthru mode. Since it is asynchronous, the operation starts but gives control to you immediately, allowing you to perform other operations while data is acquired and/or displayed.

Using software, you can set up the continuous-acquire passthru operation so that data is continuously stored and displayed, or continuously stored but not displayed.

If you want to display data in continuous-acquire passthru mode, functions in Windows perform bit copies of the image data to display memory. These functions also handle obstructions to the passthru window by automatically clipping the passthru image to the visible client window region. Therefore, even if the window is obstructed in bitmap mode, the passthru can continue unabated. Once an obstruction has been removed from the passthru window client area, Windows automatically restores the correct underlying image data.

In continuous-acquire passthru mode, data is stored in a circular buffer in device memory.

This mode also has a synchronization mechanism using a WIN32 event object. Using this object, you can synchronize your application with the DT3130 Series board to process data as it becomes available.

Continuous-acquire passthru operations continue until you stop them using software.

Source Origin

The source origin of an image is the upper left corner of the image. On the DT3130 Series board, the source origin is always 0,0.

Passthru Scaling

On a DT3130 Series board, the same scaling mechanism that is used to scale frames is used to scale passthru images.

The number of lines per frame in the scaled image can range from 1 to 480 for 60 Hz image formats or from 1 to 576 for 50 Hz image formats (in increments of 1). The number of pixels per line in the scaled image can range from 1 to 640 for 60 Hz image formats or from 1 to 768 for 50 Hz image formats (in increments of 1).

Using software, you provide the scale factor for the horizontal and vertical directions. The scale factor is the ratio of the target values (the total number of pixels or lines in the resulting scaled image) to the source values (the total number of pixels or lines in the image to scale) in each direction.

The minimum scale factor is 1; the maximum scale factor is 100 (nominal is 100).

Overlays

Overlays

You can add overlays to the display using software during passthru operations. Overlays allow you to place an image on top of another image that was captured using passthru.

Note: Overlays require Direct Draw Interface (DDI) support.

Acquisition Operations

DT3130 Series boards can acquire interlaced frames or individual fields either synchronously or asynchronously, and store them in system memory. In a synchronous acquisition, you cannot perform another operation until the synchronous acquisition completes. In an asynchronous acquisition, the operation starts but gives control to you immediately, allowing you to perform other operations while data is acquired.

Using the DT3130 Series , you can acquire a single full frame, a single field (subframe), multiple full frames, or multiple fields. Data is stored to an area in system memory that is allocated by the DT3130 Series Device Driver (called *device memory*). Table 6 lists the memory size that is used for each image format and image type supported.

Table 6: Memory Used

Video Format	Storage Image Format	Maximum Memory Used (Bytes)
60 Hz	RGB or RGB24	1,228,800
	RGB16 or YUYV422	614,400
	MONO	307,200
50 Hz	RGB or RGB24	1,769,472
	RGB16 or YUYV422	884,736
	MONO	442,368

An interrupt is generated when an even or odd field has been acquired; the PCI bus assigns the interrupt to the board automatically when it is installed.

The speed of the PCI bus allows the DT3130 Series board to transfer an unlimited number of consecutive frames across the bus in real time. You can acquire consecutive images, up to the capacity of available system RAM.

Acting as a PCI bus master, the board sends pixel data over the PCI bus directly using burst transfer rates up to 30 frames/s for 60 Hz image formats and 25 frames/s for 50 Hz image formats, when used with a 16-bit or 32-bit color display adapter board that supports DDI.

Acting as a PCI bus master, the board sends pixel data over the PCI bus directly using burst transfer rates up to 30 frames/s for 60 Hz image formats and 25 frames/s for 50 Hz image formats, when used with a 16-bit or 32-bit color display adapter board that supports DDI.

Supported Device Driver Capabilities

DT3130 Series Device Driver Capabilities 42
Initialized Control Values 66

DT3130 Series Device Driver Capabilities

Because the Frame Grabber SDK is intended to be used with all DT-Open Layers frame grabbers, the DT3130 Series may not support all of the Frame Grabber SDK capabilities or may support the Frame Grabber SDK capabilities differently from other boards.

To help you determine which capabilities are supported by the DT3130 Series boards, you can use the query functions provided by the Frame Grabber SDK. These functions return either information about a specific capability or the current value of a specific capability.

The tables in this chapter list the capabilities supported by the DT3130 Series boards and the information needed to query the board. The left column of the tables lists the capabilities along with the query key/control used for the listed function. The query's possible returned flags, if any, are indented under the key along with a description. The right column indicates whether the DT3130 Series boards support the capability or flag or the range of values supported by the capability.

To find the information about a capability more readily, use this information:

For capabilities that apply to ...	Refer to the table starting on ...
All frame grabbers	page 44
Input signals	page 46
Sync signals	page 51
Active video area	page 52
Frames	page 55
Passthru	page 59

For capabilities that apply to ...	Refer to the table starting on ...
Overlay	page 61
Memory	page 62
Acquisition	page 63
Digital I/O	page 65

Note: If your code is intended to be compatible with various Data Translation products, use the query functions to determine that the capability is supported by the installed board, prior to execution.

For more information on the functions, refer to the documentation for the Frame Grabber SDK, provided on the Imaging OMNI CD-ROM.

Table 7: General Device Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlImgQueryDeviceCaps	
Board Signature OLC_IMG_DC_OL_SIGNATURE	 0x44544F4C
Device ID OLC_IMG_DC_DEVICE_ID DT3131 DT3131-ISO DT3132 DT3132-ISO DT3133 DT3133-ISO	 8073h 8077h 8071h 8075h 8070h 8074h
Board Name OLC_IMG_DC_DEVICE_NAME DT3131 DT3131-ISO DT3132 DT3132-ISO DT3133 DT3133-ISO	 “DT3131” “DT3131-ISO” “DT3132” “DT3132-ISO” “DT3133” “DT3133-ISO”
Device Type OLC_IMG_DC_OL_DEVICE_TYPE Monochrome Frame Grabber OLC_IMG_DEV_MONO_FRAME_GRABBER Color Frame Grabber OLC_IMG_DEV_COLOR_FRAME_GRABBER	 Yes Yes
Sections Supported OLC_IMG_DC_SECTIONS Supports Input Operations OLC_FG_SECTION_INPUT Supports Camera Control Operations OLC_FG_SECTION_CAMCTL	 Yes No

Table 7: General Device Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Supports Management of Device Memory OLC_FG_SECTION_MEMORY	Yes
Supports Linear Memory Operations OLC_FG_SECTION_LINEAR	No
Supports passthru OLC_FG_SECTION_PASSTHRU	Yes
Supports DDI OLC_FG_SECTION_DDI	Yes
DtColorQueryInterface	
SDK Extension Capabilities OLT_QUERY_COLOR_INTERFACE	
Supports Signal Type COLOR_INTERFACE_SIGNAL_TYPE	True
Supports Storage Mode COLOR_INTERFACE_STORAGE_MODE	True
Supports Image Parameter COLOR_INTERFACE_IMAGE_PARAMETER	True
Supports Hardware Scaling COLOR_INTERFACE_HARDWARE_SCALING	True
Supports Digital I/O COLOR_INTERFACE_DIGITAL_IO	False
Supports Draw Acquired Frame COLOR_INTERFACE_DRAW_ACQUIRED_FRAME	True
Supports Sync Master Mode COLOR_INTERFACE_SYNC_MASTER_MODE	False
Supports Extracting RGB Frames COLOR_INTERFACE_EXTRACT_FRAME	False
Supports Drawing Extracted Data COLOR_INTERFACE_DRAW_BUFFER	False

Table 8: Input Signal Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryInputCaps	
Number of Input Sources OLC_FG_INPUT_SOURCE_COUNT	3[a]
Supports Input Filter Selection OLC_FG_IC_DOES_INPUT_FILTER	No
Supports Input Filter Query OLC_FG_IC_DOES_QUERY_INPUT_FILTER	No
Supported Filters OLC_FG_IC_INPUT_FILTER_LIMITS AC Coupled, no Input Filter OLC_FG_FILT_AC_NONE AC Coupled, 50 Hz Input Filter OLC_FG_FILT_AC_50 AC Coupled, 60 Hz Input Filter OLC_FG_FILT_AC_60 DC Coupled, no Input Filter OLC_FG_FILT_DC_NONE	N/A
Supports Programmable A/D OLC_FG_IC_DOES_PROG_A2D	No
Supports Programmable A/D Query OLC_FG_IC_DOES_QUERY_PROG_A2D	No
Voltage Range of Black Level, in µV OLC_FG_IC_BLACK_LEVEL_LIMITS	N/A
Voltage Range of White Level, in µV OLC_FG_IC_WHITE_LEVEL_LIMITS	N/A
Supports Programmable Pixel Clock OLC_FG_IC_DOES_PIXEL_CLOCK	No
Supports Pixel Clock Query OLC_FG_IC_DOES_QUERY_PIXEL_CLOCK	Yes

Table 8: Input Signal Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Range of Internal Input Clock Frequency, in Hz OLC_FG_IC_CLOCK_FREQ_LIMITS	Fixed 50 Hz: 15,000,000 60 Hz: 12,500,000
Clock Sources OLC_FG_IC_CLOCK_SOURCE_LIMITS Supports Internal Clock OLC_FG_CLOCK_INTERNAL Supports External Clock OLC_FG_CLOCK_EXTERNAL	 Yes No
Provides Trigger OLC_FG_IC_DOES_TRIGGER	Yes
Trigger Types OLC_FG_TRIGGER_TYPE_LIMITS Supports Externally Triggered Acquisition OLC_FG_TRIG_EXTERNAL_LINE	 Yes
Multiple Trigger Types OLC_FG_IC_MULT_TRIGGER_TYPE_LIMITS Supports Externally Triggered Acquisition OLC_FG_TRIG_EXTERNAL_LINE	 Yes
Multiple Trigger Modes OLC_FG_IC_MULT_TRIGGER_MODE_LIMITS Trigger Starts Multiple Frame Acquisition OLC_FG_MODE_START Trigger Starts Each Frame Acquisition OLC_FG_MODE_EACH	 Yes Yes
Supports Strobing OLC_FG_IC_DOES_STROBE	 Yes

Table 8: Input Signal Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Strobing Modes For Each Input Group OLC_FG_IC_STROBE_TYPE_LIMITS Can Strobe After Each Field OLC_FG_STROBE_FIELD_BASED Can Strobe After Each Frame OLC_FG_STROBE_FRAME_BASED Can Strobe On A Software Command OLC_FG_STROBE_NOW	 Yes Yes Yes Yes
Strobe Pulse Width Limits OLC_FG_IC_STROBE_PULSE_WIDTH_LIST_LIMITS	 min: 3300 μs max: 426600 μs nominal: 3300 μs count: 8
Strobe Pulse Width List, in μs OLC_FG_IC_STROBE_PULSE_WIDTH_LIST	 3300 6600 13300 26600 53300 106600 213300 426600
Number of LUTs OLC_FG_ILUT_COUNT	 0
Maximum Index Allowed in each ILUT OLC_FG_IC_MAX_ILUT_INDEX	 N/A
Maximum Value Allowed in each ILUT OLC_FG_IC_MAX_ILUT_VALUE	 N/A

Table 8: Input Signal Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
DtColorSignalType	
Signal Type in the SDK Extensions OLT_SIGNAL_TYPE Supports Monochrome Signal Type OLC_MONO_SIGNAL Supports Y/C Signal Type (Luminance/Chrominance) OLC_YC_SIGNAL Support Composite Signal Type OLC_COMPOSITE_SIGNAL Supports RGB Signal OLC_RGB_SIGNAL Supports Dual-Mono SIgnal OLC_DUAL_MONO_SIGNAL Supports Triple-Mono Signal OLC_TRIPLE_MONO_SIGNAL	 Yes Yes Yes No No No
DtColorImageParameters Image Parameters in the SDK Extensions OLT_COLOR_PARAMETER Brightness Values OLC_SET_BRIGHTNESS OLT_COLOR_PARAMETER Contrast Values OLC_SET_CONTRAST V-Saturation Values OLC_SET_V_SAT	 min: 0 max: 255 nominal: 128 granularity: 1 min: 0 max: 511 nominal: 216 granularity: 1 min: 0 max: 511 nominal: 180 granularity: 1

Table 8: Input Signal Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Image Parameters in the SDK Extensions	
U-Saturation Values	
OLC_SET_U_SAT	min: 0 max: 511 nominal: 254 granularity: 1
Hue Values	
OLC_SET_HUE	min: 0 max: 255 nominal: 128 granularity: 1
Red Level Values	
OLC_SET_RED_LEVEL	N/A
Green Level Values	
OLC_SET_GREEN_LEVEL	N/A
Blue Level Values	
OLC_SET_BLUE_LEVEL	N/A
Red Reference	
OLC_SET_RED_REF	N/A
Red Offset	
OLC_SET_RED_OFFSET	N/A
Green Reference	
OLC_SET_GREEN_REF	N/A
Green Offset	
OLC_SET_GREEN_OFFSET	N/A
Blue Reference	
OLC_SET_BLUE_REF	N/A
Blue Offset	
OLC_SET_BLUE_OFFSET	N/A

a. The DT3131 and DT3131-ISO boards consist of one device; the DT3132 and DT3132-ISO consist of two devices; and the DT3133 and DT3133-ISO boards consists of three devices. Each device corresponds to three input channels. Refer to page 13 for more information.

Table 9: Sync Signal Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryInputCaps	
Supports Input Video Selection OLC_FG_IC_DOES_VIDEO_SELECT	Yes
Supports Input Video Selection Query OLC_FG_IC_DOES_QUERY_VIDEO_SELECT	Yes
Video Types OLC_FG_IC_VIDEO_TYPE_LIMITS Supports Composite Video Source OLC_FG_VID_COMPOSITE Supports Variable Scan Video Source OLC_FG_VID_VARSCAN	 Yes No
Video Sources OLC_FG_IC_CSYNC_SOURCE_LIMITS Composite Sync from Current Input Only OLC_FG_CSYNC_CURRENT_SRC Composite Sync from Any Specified Input OLC_FG_CSYNC_SPECIFIC_SRC Composite Sync from External Sync Line OLC_FG_CSYNC_EXTERNAL_LINE	 Yes No No
Composite Sync Threshold Limits, in mV OLC_FG_IC_CSYNC_THRESH_LIST_LIMITS	N/A
Composite Sync Threshold List OLC_FG_IC_CSYNC_THRESH_LIST	N/A
Supports Sync Sentinel OLC_FG_IC_DOES_SYNC_SENTINEL	No
Supports Sync Sentinel Query OLC_FG_IC_DOES_QUERY_SYNC_SENTINEL	Yes

Table 9: Sync Signal Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Sync Sentinel Types OLC_FG_IC_SYNC_SENTINEL_TYPE_LIMITS Supports Fixed Sync Sentinel OLC_FG_SYNC_SENTINEL_FIXED Supports Variable Sync Sentinel OLC_FG_SYNC_SENTINEL_VARIABLE	 No No
DtColorSyncMasterMode	
Sync Master in SDK Extensions OLT_SYNC_MASTER_PARAMETER Enable Sync Master Mode OLC_SYNC_MASTER_ENABLE	 No

Table 10: Active Video Area Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryInputCaps	
Supports Defining of Active Video Area OLC_FG_IC_DOES_ACTIVE_VIDEO	 Yes
Supports Active Video Area Query OLC_FG_IC_DOES_QUERY_ACTIVE_VIDEO	 Yes
Range of Back Porch Start Position OLC_FG_IC_BACK_PORCH_START_LIMITS	 min: 0 max: 0 nominal: 0 granularity: 0

Table 10: Active Video Area Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Range of Clamp Start Position OLC_FG_IC_CLAMP_START_LIMITS	min: 0 max: 0 nominal: 0 granularity: 0
Range of Clamp End Position OLC_FG_IC_CLAMP_END_LIMITS	min: 0 max: 0 nominal: 0 granularity: 0
Range of Total Pixels Per Line Control OLC_FG_IC_TOTAL_PIX_PER_LINE_LIMITS	min: 50 Hz:1135 60 Hz: 910 max: 50 Hz: 1135 60 Hz: 910 nominal: 50 Hz: 1135 60 Hz: 910 granularity: 0
Range of First Active Pixel Position OLC_FG_IC_ACTIVE_PIXEL_LIMITS	min: 0 max: 255 nominal: 50 Hz: 190 60 Hz: 140 granularity: 1

Table 10: Active Video Area Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Range of Active Pixels Count OLC_FG_IC_ACTIVE_WIDTH_LIMITS	min: 50 Hz: 768 60 Hz: 640 max: 50 Hz: 768 60 Hz: 640 nominal: 50 Hz: 768 60 Hz: 640 granularity: 0
Range of Total Lines per Field Control OLC_FG_IC_TOTAL_LINES_PER_FLD_LIMITS	min: 50 Hz: 312 60 Hz: 262 max: 50 Hz: 312 60 Hz: 262 nominal: 50 Hz: 312 60 Hz: 262 granularity: 0
Range of First Active Line Position OLC_FG_IC_ACTIVE_LINE_LIMITS	min: 0 max: 255 nominal: 50 Hz: 31 60 Hz: 21 granularity: 1

Table 10: Active Video Area Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Range of Active Lines Count OLC_FG_IC_ACTIVE_HEIGHT_LIMITS	min: 50 Hz: 288 60 Hz: 240 max: 50 Hz: 288 60 Hz: 240 nominal: 50 Hz: 288 60 Hz: 240 granularity: 0

Table 11: Frame Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryInputCaps	
Supports Frame Selection OLC_FG_IC_DOES_FRAME_SELECT	Yes
Supports Frame Selection Query OLC_FG_IC_DOES_QUERY_FRAME_SELECT	Yes
Range of Frame Top Control OLC_FG_IC_FRAME_TOP_LIMITS	min: 0 max: 50 Hz: 575 60 Hz: 479 nominal: 0 granularity: 1

Table 11: Frame Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Range of Frame Left Control OLC_FG_IC_FRAME_LEFT_LIMITS	min: 0 max: 50 Hz: 763 60 Hz: 635 nominal: 0 granularity: 1
Range of Frame Height Control OLC_FG_IC_FRAME_HEIGHT_LIMITS	min: 1 max: 50 Hz: 576 60 Hz: 480 nominal: 50 Hz: 576 60 Hz: 480 granularity: 1
Range of Frame Width Control OLC_FG_IC_FRAME_WIDTH_LIMITS	min: 1 max: 50 Hz: 768 60 Hz: 640 nominal: 50 Hz: 768 60 Hz: 640 granularity: 1
Range Between Pixels (Scale factor - horizontal) OLC_FG_IC_FRAME_HINC_LIMITS	min: 1 max: 10[a] nominal: 1 granularity: 1

Table 11: Frame Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Range Between Lines (Scale factor - vertical) OLC_FG_IC_FRAME_VINC_LIMITS	min: 1 max: 10[a] nominal: 1 granularity: 1
Frame Types OLC_FG_IC_FRAME_TYPE_LIMITS Acquire Interlaced Frame Starting on Even Field OLC_FG_FRM_IL_FRAME_EVEN Acquire Interlaced Frame Starting on Odd Field OLC_FG_FRM_IL_FRAME_ODD Acquire Interlaced Frame Starting on Next Field OLC_FG_FRM_IL_FRAME_NEXT Acquire the Even Field OLC_FG_FRM_FIELD_EVEN Acquire the Odd Field OLC_FG_FRM_FIELD_ODD Acquire the Next Field OLC_FG_FRM_FIELD_NEXT Acquire the Next Noninterlaced Frame OLC_FG_FRM_NON_INTERLACED	 Yes Yes Yes Yes Yes Yes No
Maximum Number of Pixels in Frame OLC_FG_IC_MAX_FRAME_SIZE	50 Hz: 442368 60 Hz: 307200
Number of Bytes in a Pixel OLC_FG_IC_PIXEL_DEPTH	RGB = 4 RGB24 = 3 RGB16 = 2 RGB15 = 2 YUYV422 = 2 Mono = 1

Table 11: Frame Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
DtColorHardwareScaling	
Hardware Scaling in SDK Extensions OLT_SCALE_PARAM	
Horizontal scale factor (percentage) hscale	min: 1 max: 100 nominal: 100 granularity: 1
Vertical scale factor (percentage) vscale	min: 1 max: 100 nominal: 100 granularity: 1
DtColorStorageMode	
Storage Mode in the SDK Extensions OLT_IMAGE_MODE	
Supports Monochrome Mode OLC_IMAGE_MONO	Yes
Supports YUV Mode OLC_IMAGE_YUV	No
Supports RGB OLC_IMAGE_RGB	Yes
Supports RGB24 OLC_IMAGE_RGB24	Yes
Supports RGB16 OLC_IMAGE_RGB_16	Yes
Supports RGB15 OLC_IMAGE_RGB_15	Yes
Supports YUYV422 OLC_IMAGE_YUYV_422	Yes

a. FRAME_HINC/FRAME_VINC can be 1 (every pixel) or a multiple of 2 up to a maximum value of 16. For greater control, use the **DtColorHardwareScaling** function in the SDK Extensions.

Table 12: Passthru Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryPassthruCaps	
Supports Passthru Section OLC_FG_PC_DOES_PASSTHRU	Yes
Passthru Modes OLC_FG_PC_PASSTHRU_MODE_LIMITS Supports Async Direct OLC_FG_PASSTHRU_ASYNC_DIRECT Supports Sync Direct OLC_FG_PASSTHRU_SYNC_DIRECT Supports Async Bitmap OLC_FG_PASSTHRU_ASYNC_BITMAP Supports Sync Bitmap OLC_FG_PASSTHRU_SYNC_BITMAP Supports Continuous-Acquire OLC_FG_PASSTHRU_ASYNC_BITMAP_EXTENDED	 No No Yes No Yes
Source Origin OLC_FG_PC_DOES_SOURCE_ORIGIN Available Range for the X Value of the Source Origin OLC_FG_PC_SRC_ORIGIN_X_LIMITS Available Range for the Y value of the Source Origin OLC_FG_PC_SRC_ORIGIN_Y_LIMITS	 No N/A N/A

Table 12: Passthru Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Passthru Scaling OLC_FG_PC_DOES_SCALING Range of Legal Values for Height OLC_FG_PC_SCALE_HEIGHT_LIMITS Range of Legal Values for Width OLC_FG_PC_SCALE_WIDTH_LIMITS	 No[a] N/A N/A
Passthru LUT OLC_FG_PC_DOES_PASSTHRU_LUT Number of Extra Palette Entries OLC_FG_PC_MAX_PALETTE_INDEX Maximum RGB Value for Palette OLC_FG_PC_MAX_PALETTE_VALUE Number of Entries in Passthru LUT OLC_FG_PC_MAX_PLUT_INDEX Maximum RGB Value for Passthru LUT OLC_FG_PC_MAX_PLUT_VALUE	 No N/A N/A N/A N/A
Passthru snapshot OLC_FG_PC_DOES_PASSTHRU_SNAPSHOT	 Yes

a. With the DT3130 Series, use the **DtColorHardwareScaling** function to perform passthru scaling.

Table 13: Overlay Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryDDICaps	
Passthru with DDI OLC_FG_DDI_FAST_PASSTHRU	No
Overlay support OLC_FG_DDI_OVERLAYS	Yes
Translucent overlay capability OLC_FG_DDI_TRANSLUCENT_OVERLAYS	No
Color overlay capability OLC_FG_DDI_COLOR_OVERLAY	Yes
Multiple overlay surface capability OLC_FG_DDI_MULTIPLE_SURFACES	Yes
Color keying (filtering) OLC_FG_DDI_COLOR_KEY_CONTROL	Yes
Add overlay to image OLC_FG_DDI_OVERLAY_ON_FRAME	No
User-managed DDI surface support OLC_FG_DDI_USER_SURFACE_PTR	No
Passthru event synchronization support OLC_FG_DDI_PASSTHRU_SYNC_EVENT	Yes

Table 14: Memory Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryMemoryCaps	
Memory Types OLC_FG_MC_MEMORY_TYPES Volatile Memory OLC_FG_MEM_VOLATILE Nonvolatile Memory OLC_FG_MEM_NON_VOLATILE	 Yes No
Number of Volatile Buffer Handles OLC_FG_MC_VOL_COUNT	1[a]
Number of Nonvolatile Buffer Handles OLC_FG_MC_NONVOL_COUNT	N/A

a. You can allocate as many frames as the system memory allows using **OlFgAllocateBuiltInFrame**.

Table 15: Acquisition Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryInputCaps	
Acquisition Types (single frame) OLC_FG_IC_SINGLE_FRAME_OPS *-Single Frame to Host (sync)* Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT *-Single Frame to Device (sync)* Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT *-Single Frame to Host (async)* Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT -Single Frame to Device (async) Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT	 No No No Yes No No No No No Yes No No

Table 15: Acquisition Capabilities for the DT3130 Series Device Driver (cont.)

Capability	DT3130 Series Support
Acquisition Types (multiple frame) OLC_FG_IC_MULT_FRAME_OPS *-Multiple Frames to Host (sync)* Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT *-Multiple Frames to Device (sync)* Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT *-Multiple Frames to Host (async)* Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT *-Multiple Frames to Device (async)* Supports Full Frame Acquisition OLC_FG_ACQ_FRAME Supports Subframe Acquisition OLC_FG_ACQ_SUBFRAME Supports Frame-to-Fit Acquisition OLC_FG_ACQ_FRAME_TO_FIT	 No No No Yes No No No No No Yes No No
Supports Drawing Acquired Frame OLC_FG_IC_DOES_DRAW_ACQUIRED_FRAME OLC_FG_IC_DOES_DRAW_ACQUIRED_FRAME_EX	 Yes Yes

Table 16: Digital I/O Capabilities for the DT3130 Series Device Driver

Capability	DT3130 Series Support
OlFgQueryCameraControlCaps	
Number of Digital Output Lines OLC_FG_CC_DIG_OUT_COUNT	0
DtColorDigitalIOControl	
Number of Digital Input/Output Lines	0

Initialized Control Values

Table 17 lists the default control values after opening or initializing the DT3130 Series Device Driver.

Table 17: Default Control Values

Control Name	Value
OLC_FG_CTL_INPUT_FILTER	N/A
OLC_FG_CTL_BLACK_LEVEL	N/A
OLC_FG_CTL_WHITE_LEVEL	N/A
OLC_FG_CTL_VIDEO_TYPE	OLC_FG_VID_COMPOSITE
OLC_FG_CTL_CSYNC_SOURCE	OLC_FG_CSYNC_CURRENT_SRC
OLC_FG_CTL_CSYNC_THRESH	N/A
OLC_FG_CTL_SYNC_SENTINEL	N/A
OLC_FG_CTL_HSYNC_INSERT_POS	N/A
OLC_FG_CTL_HSYNC_SEARCH_POS	N/A
OLC_FG_CTL_VSYNC_INSERT_POS	N/A
OLC_FG_CTL_VSYNC_SEARCH_POS	N/A
OLC_FG_IC_BACK_PORCH_START_ LIMITS	0
OLC_FG_IC_CLAMP_START_LIMITS	0
OLC_FG_IC_CLAMP_END_LIMITS	0
OLC_FG_CTL_TOTAL_PIX_PER_LINE	50 Hz: 1135 60 Hz: 910
OLC_FG_CTL_FIRST_ACTIVE_PIXEL	50 Hz: 190 60 Hz: 140
OLC_FG_CTL_ACTIVE_PIXEL_COUNT	50 Hz: 768 60 Hz: 640

Table 17: Default Control Values (cont.)

Control Name	Value
OLC_FG_CTL_TOTAL_LINES_PER_FLD	50 Hz: 312 60 Hz: 262
OLC_FG_CTL_FIRST_ACTIVE_LINE	50 Hz: 31 60 Hz: 21
OLC_FG_CTL_ACTIVE_LINE_COUNT	50 Hz: 288 60 Hz: 240
OLC_FG_CTL_FRAME_TOP	0
OLC_FG_CTL_FRAME_LEFT	0
OLC_FG_CTL_FRAME_WIDTH	50 Hz: 768 60 Hz: 640
OLC_FG_CTL_FRAME_HEIGHT	50 Hz: 576 60 Hz: 480
OLC_FG_CTL_HOR_FRAME_INC	1
OLC_FG_CTL_VER_FRAME_INC	1
OLC_FG_CTL_CLOCK_FREQ	50 Hz: 15,000,000 60 Hz: 12,500,000
OLC_FG_CTL_CLOCK_SOURCE	OLC_FG_CLOCK_INTERNAL
OLC_FG_CTL_FRAME_TYPE	OLC_FG_FRM_IL_FRAME_EVEN
OLC_FG_IC_STROBE_PULSE_WIDTH_LIST_LIMITS	3300 µs
OLC_FG_CTL_ILUT	N/A
DtColorSignalType	OLC_COMPOSITE_SIGNAL
DtColorStorageMode	OLC_IMAGE_RGB

Table 17: Default Control Values (cont.)

Control Name	Value
DtColorImageParameters	
Brightness	128
Contrast	216
V Saturation	180
U Saturation	254
Hue	128
Red Level	N/A
Green Level	N/A
Blue Level	N/A
DtColorHardwareScaling	
Horizontal scale factor	100
Vertical scale factor	100
DtColorDigitalIOControl	
Digital I/O Configuration	0
DtColorSyncMasterMode	
Enable/Disable	0 (disabled)

Programming Flowcharts

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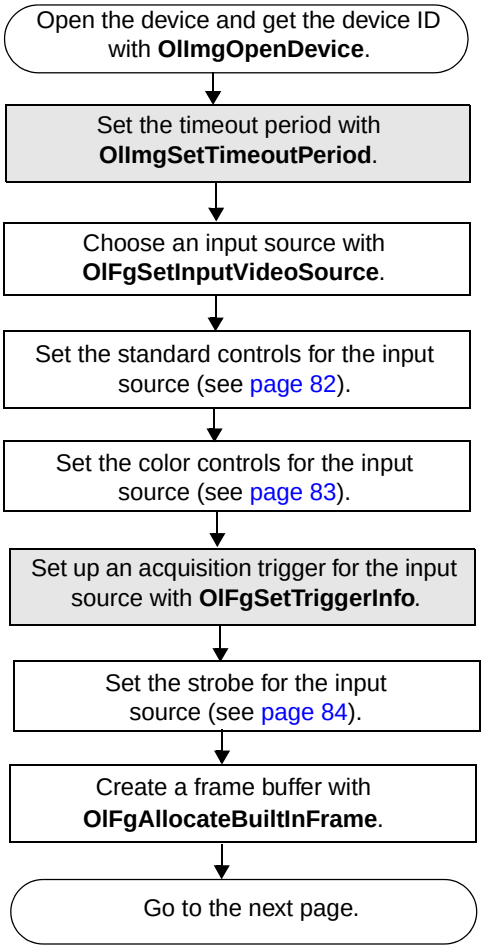
The following flowcharts show the steps required to perform imaging operations using DT-Open Layers. For illustration purposes, the functions in the Frame Grabber SDK and Color SDK Extensions are shown; however, the concepts apply to all DT-Open Layers software for imaging.

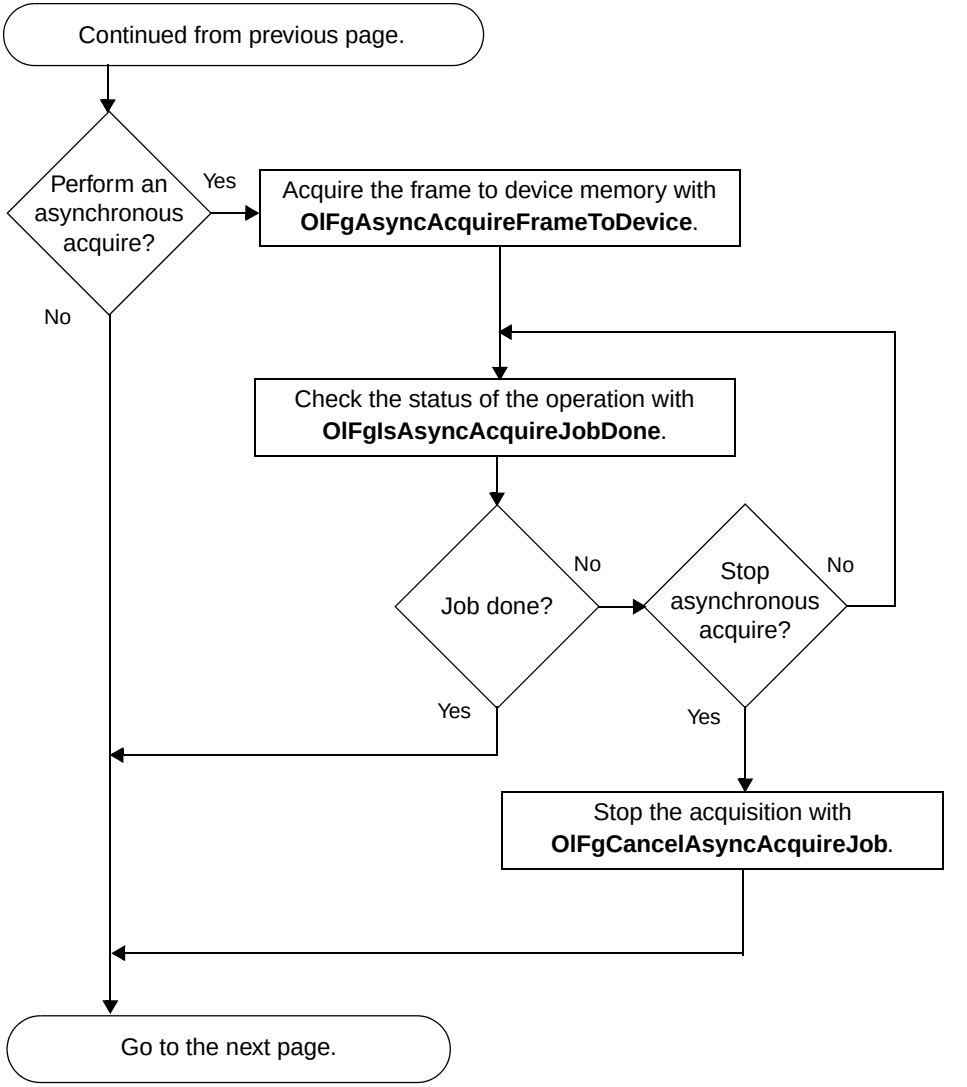
Note that many steps represent several substeps; if you are unfamiliar with the detailed operations involved with any one step, refer to the indicated page for detailed information. Optional steps appear in shaded boxes.

Note: Although the flowcharts do not show error/status checking, it is recommended that you check for error/status messages after calling each function.

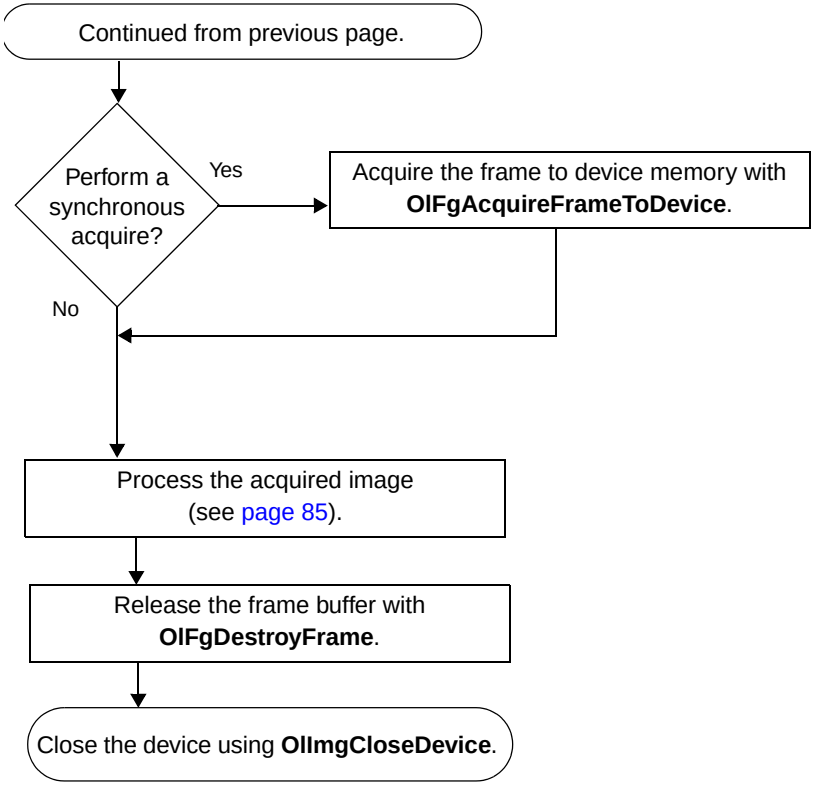
Single-Frame Acquisition



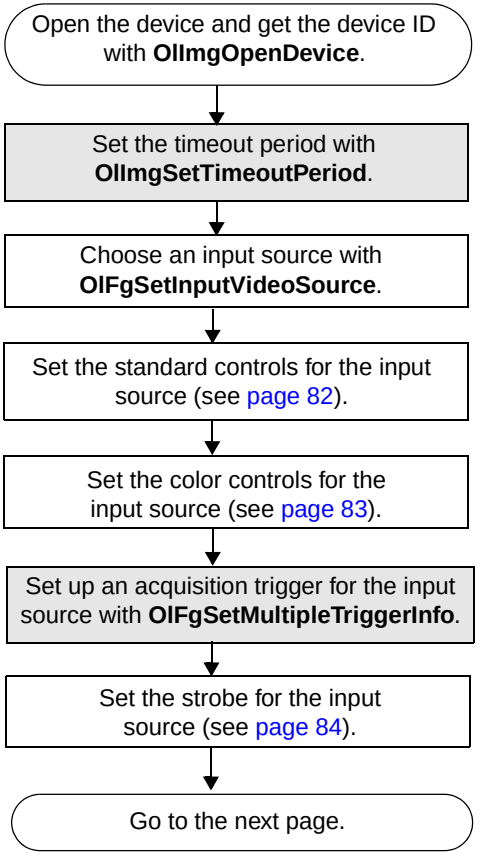
Single-Frame Acquisition (cont.)



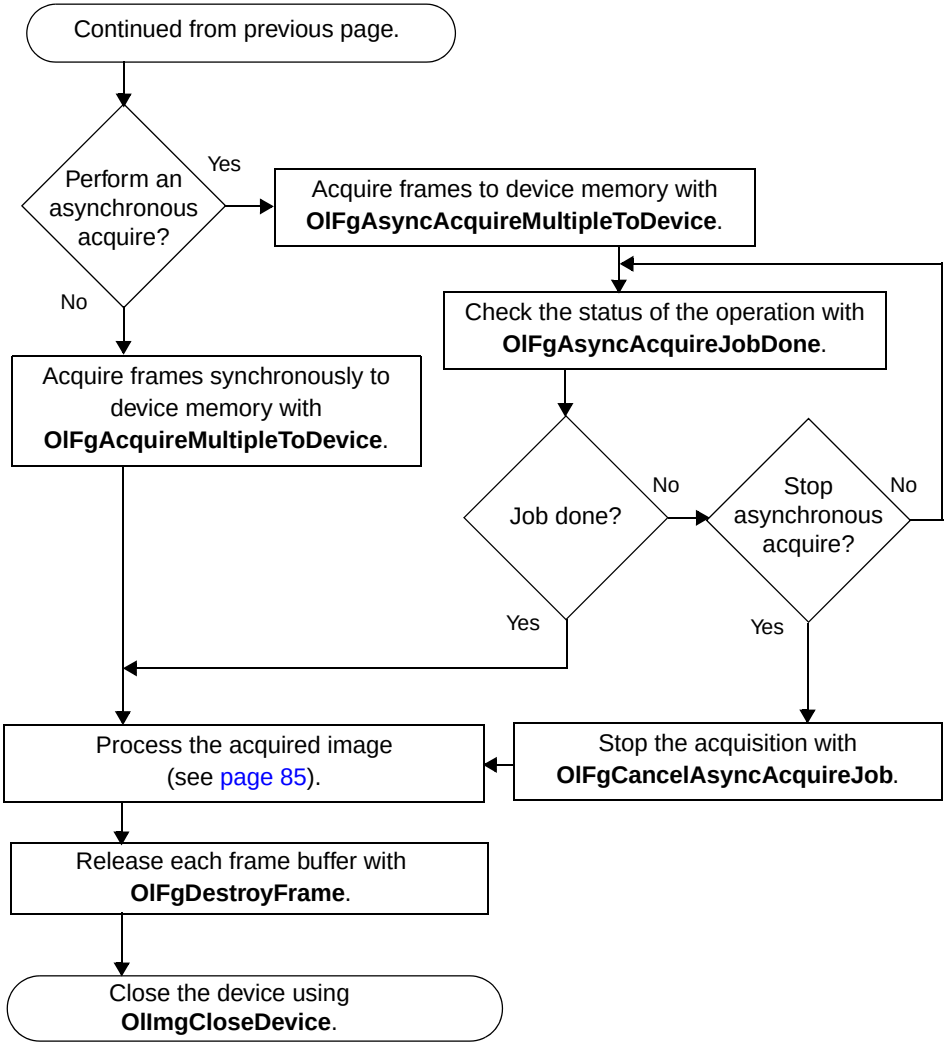
Single-Frame Acquisition (cont.)



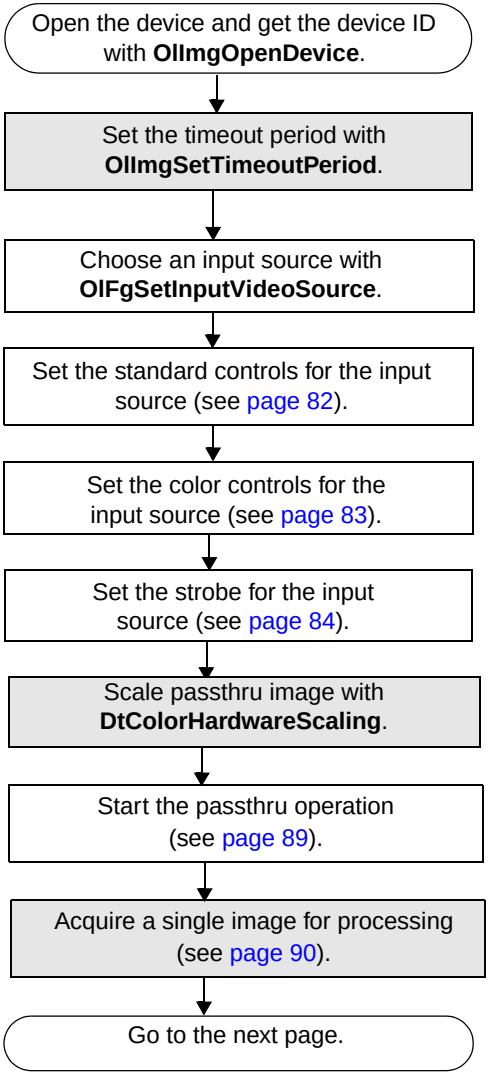
Multiple-Frame Acquisition



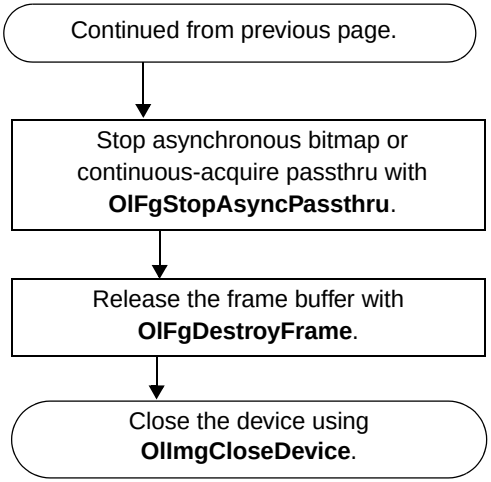
Multiple-Frame Acquisition (cont.)



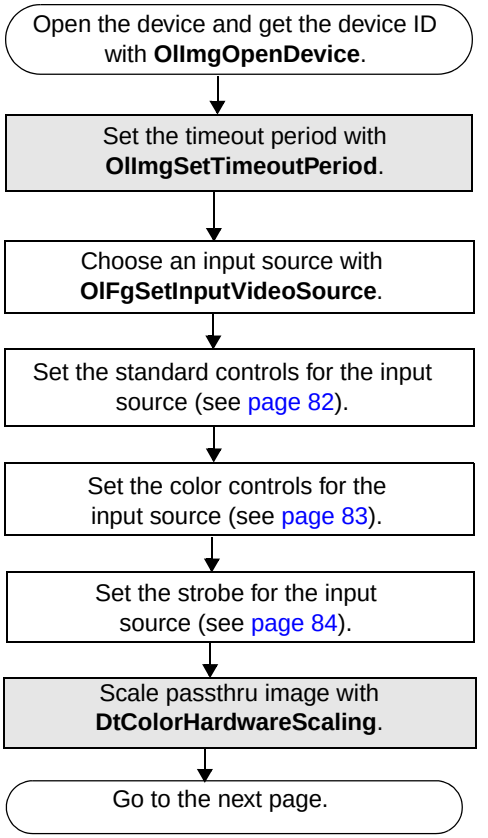
Passthru without Overlays



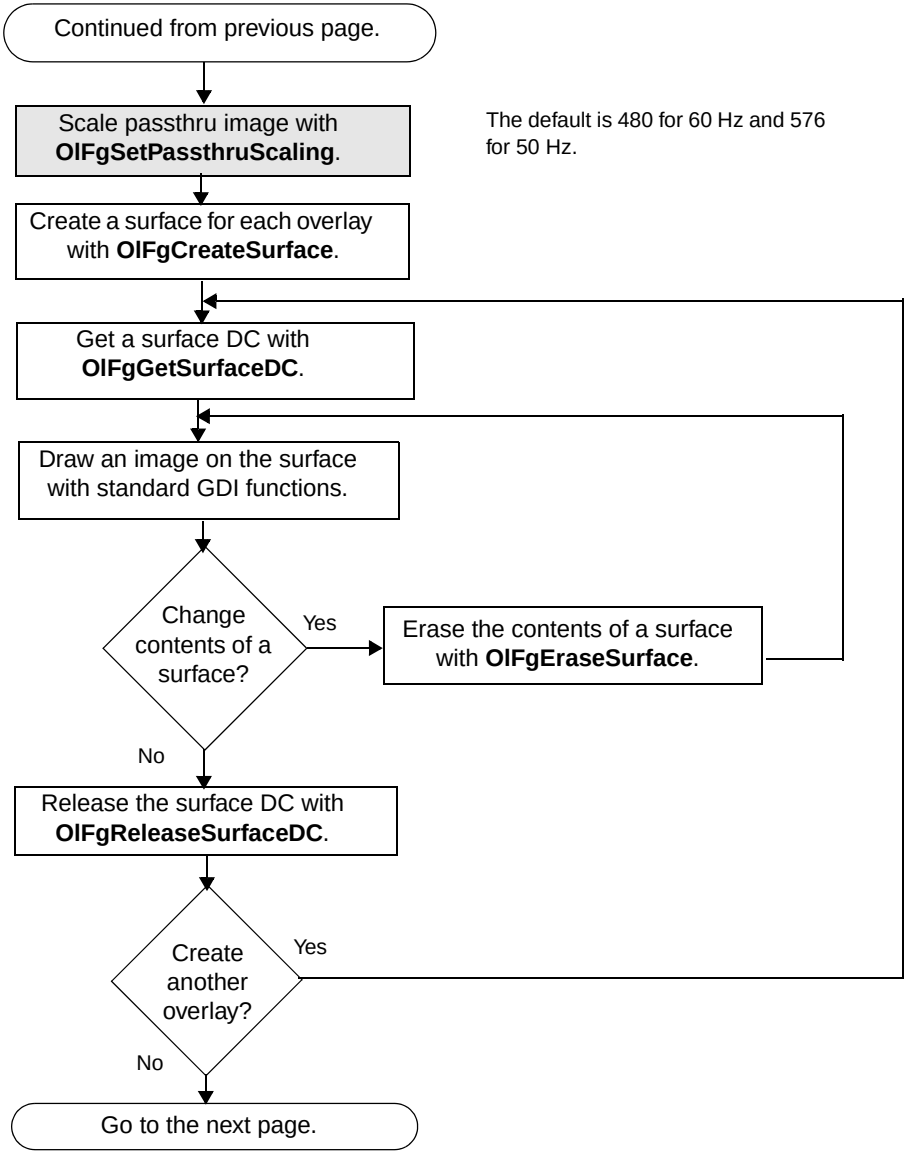
Passthru without Overlays(cont.)



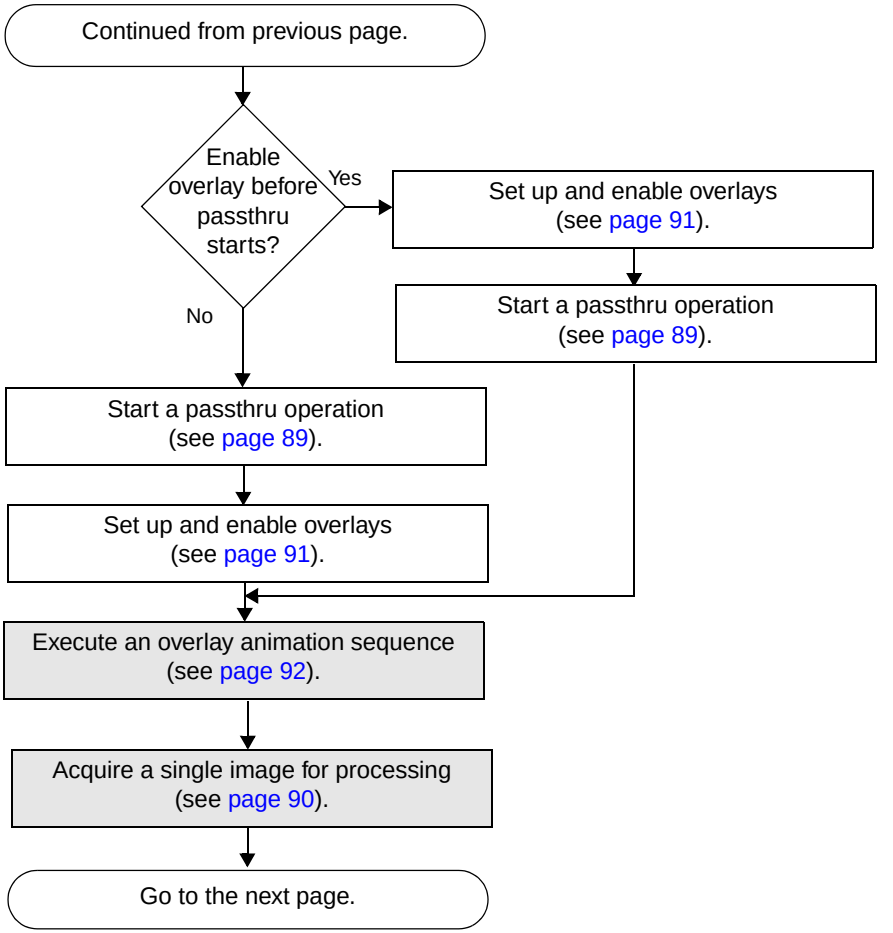
Passthru with Overlays



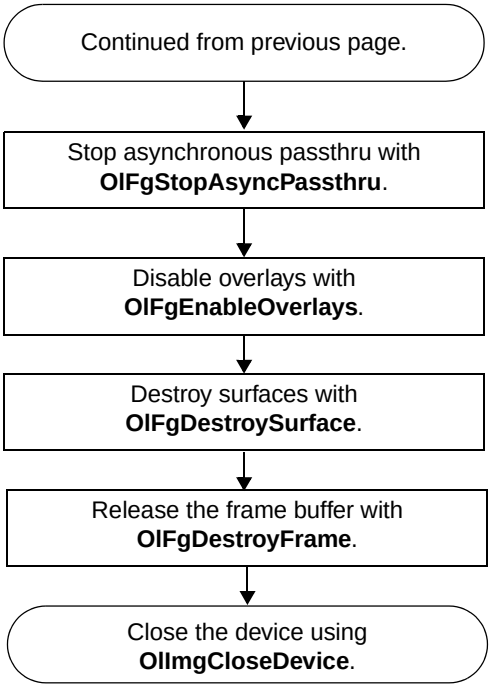
Passthru with Overlays (cont.)



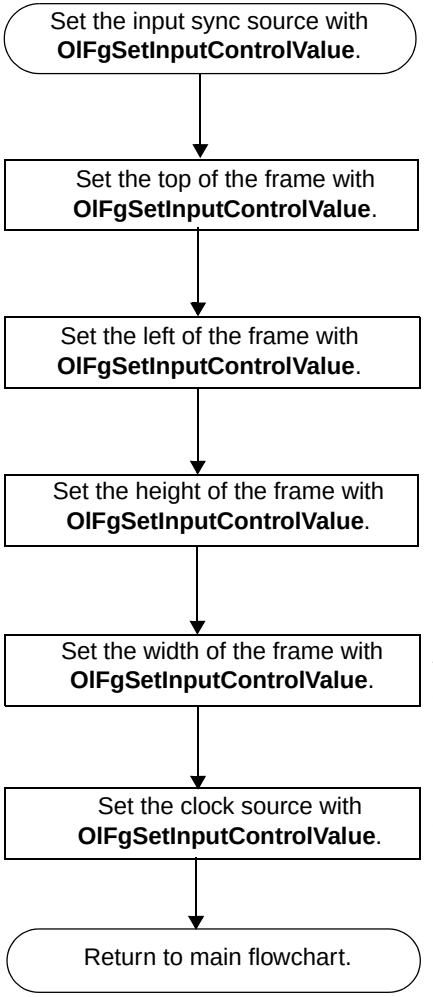
Passthru with Overlays (cont.)



Passthru with Overlays (cont.)



Set the Standard Controls for the Input Channel



Use the key OLC_FG_CTL_VIDEO_TYPE to select a composite sync source and OLC_FG_CTL_CSYNC_SOURCE to specify that the current channel provides the sync signal.

Use the key OLC_FG_CTL_FRAME_TOP to set the first line of video, relative to the active video area, to digitize for the selected input channel. The default is 0.

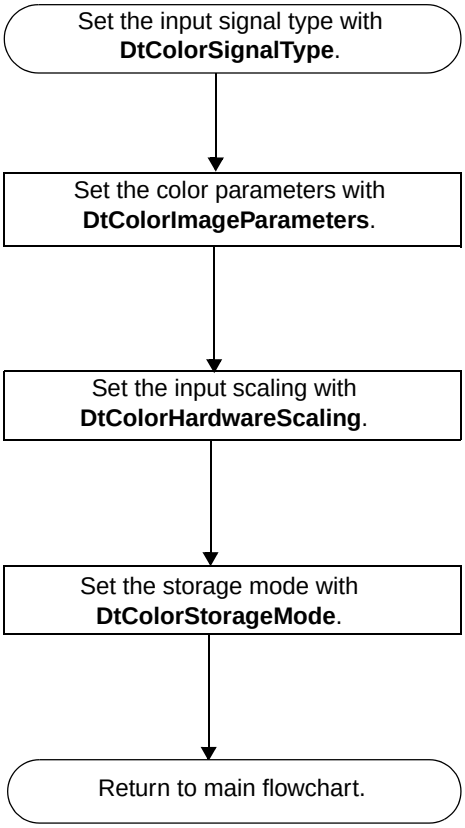
Use the key OLC_FG_CTL_FRAME_LEFT to set the first pixel of video, relative to the active video area, to digitize for the selected input channel. The default is 0.

Use the key OLC_FG_CTL_FRAME_HEIGHT to set the number of lines per field of video to digitize for the selected input channel.The default is 576 for 50 Hz and 480 for 60 Hz.

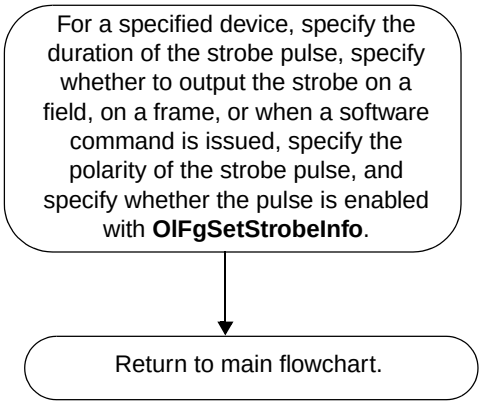
Use the key OLC_FG_CTL_FRAME_WIDTH to set the number of pixels per line of video to digitize for the selected input channel. The default is 786 for 50 Hz and 640 for 60 Hz.

Use the key OLC_FG_CTL_CLOCK_SOURCE to set the pixel clock to internal.

Set the Color Controls for the Input Channel

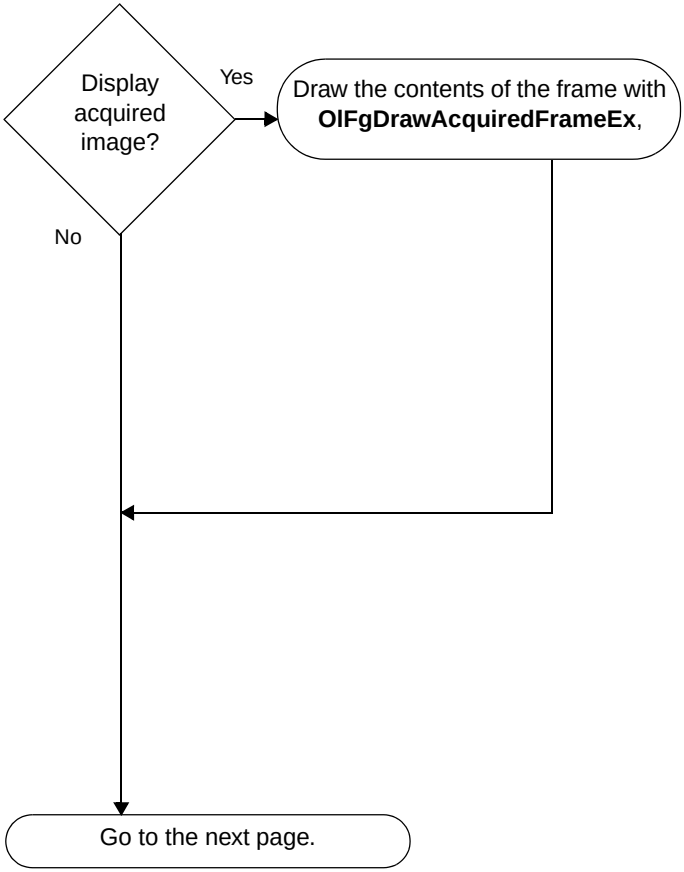


Set the Strobe for the Input Channel

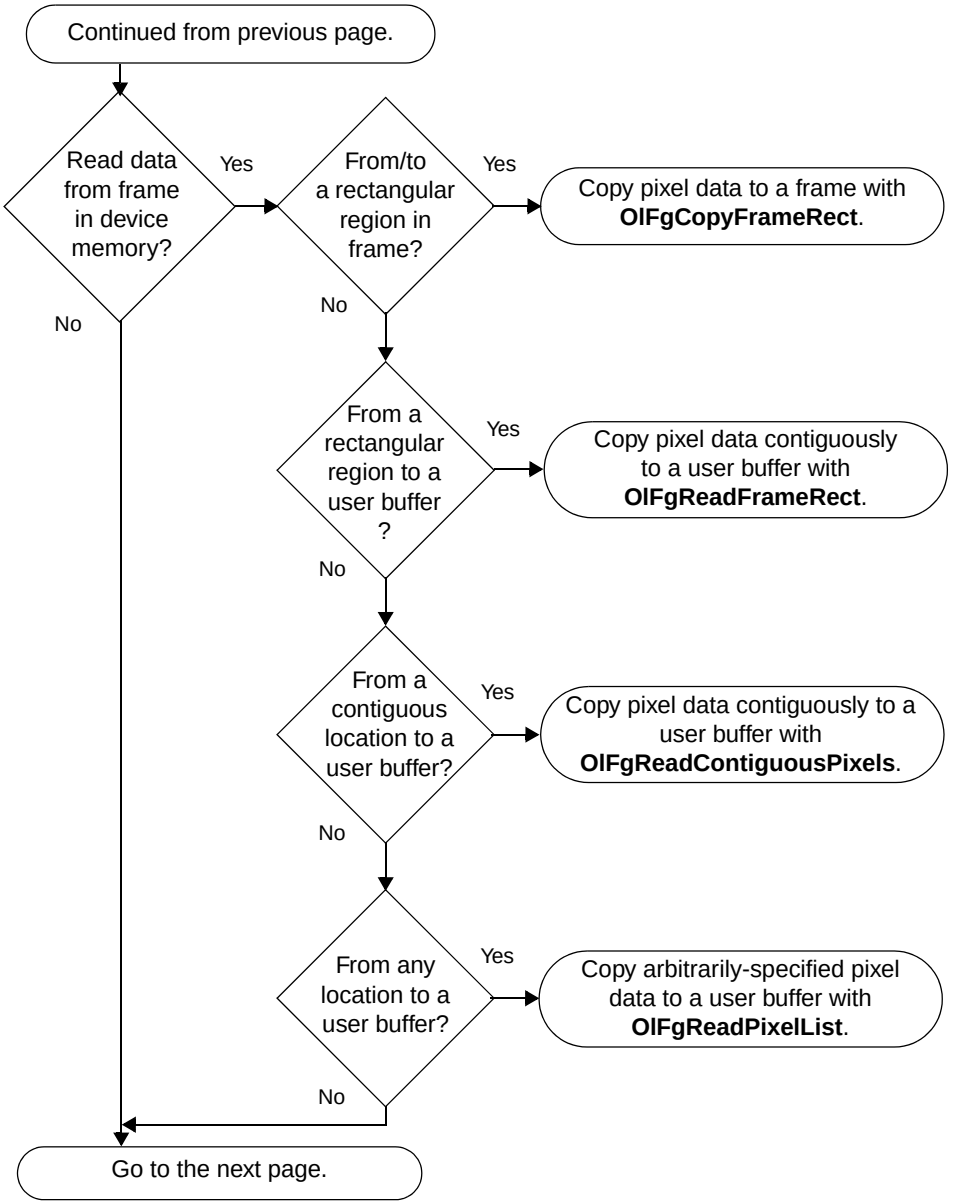


By default, the duration is 3300 µs.

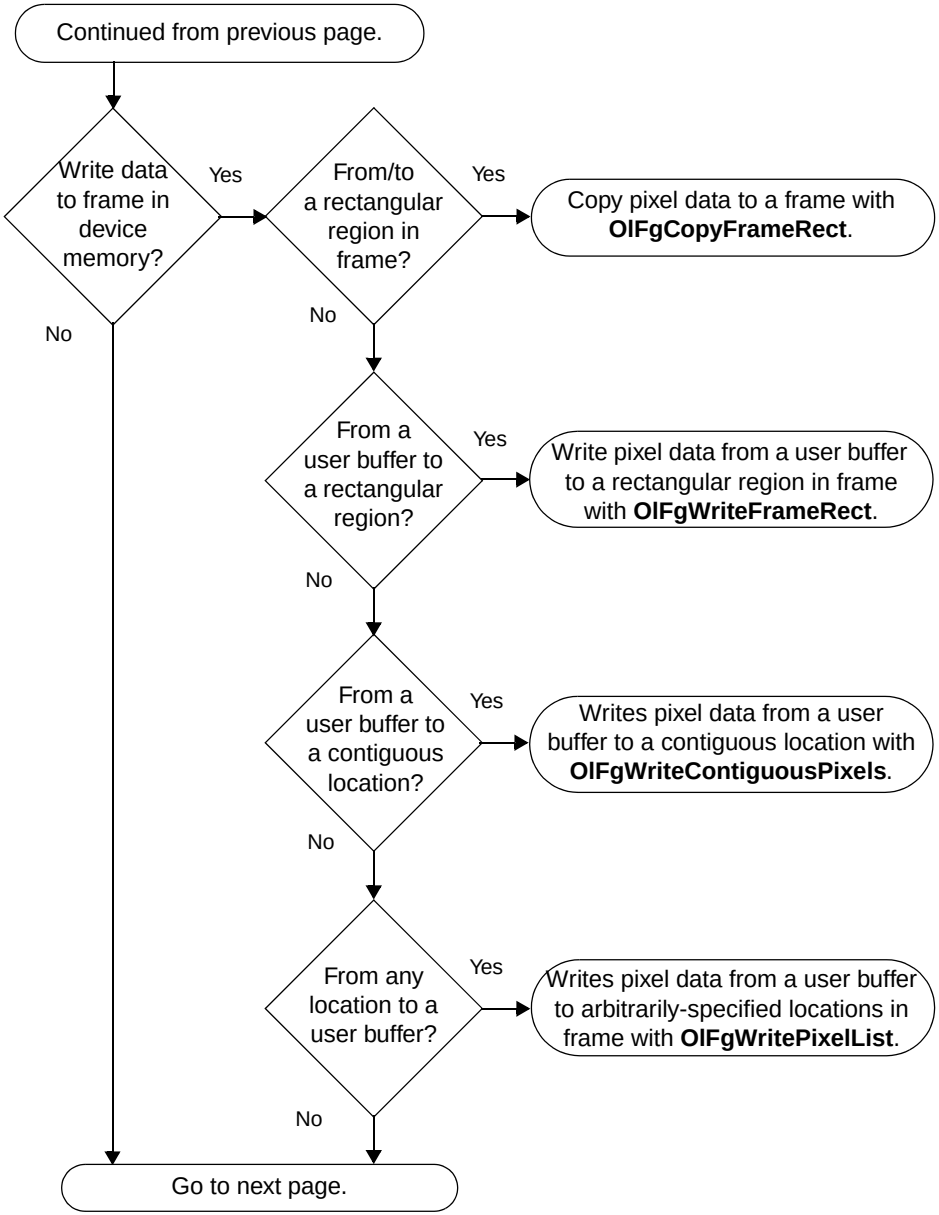
Process the Acquired Image



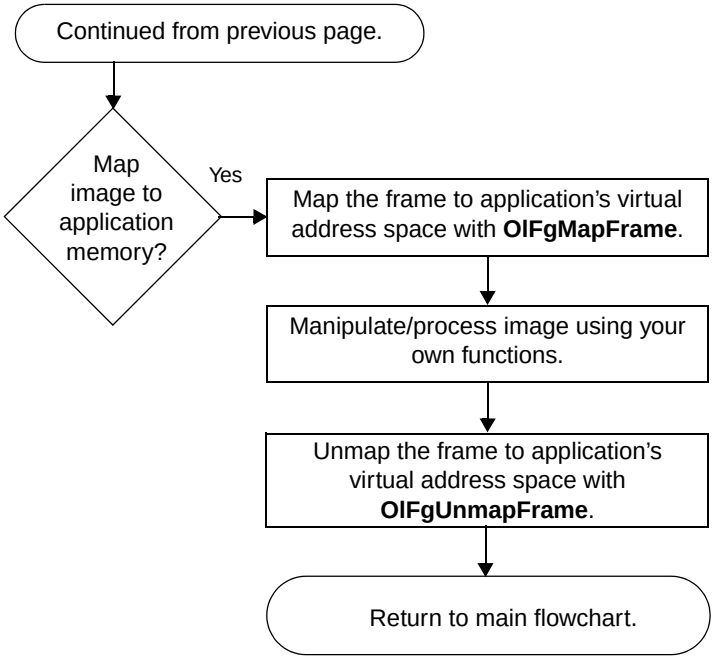
Process the Acquired Image



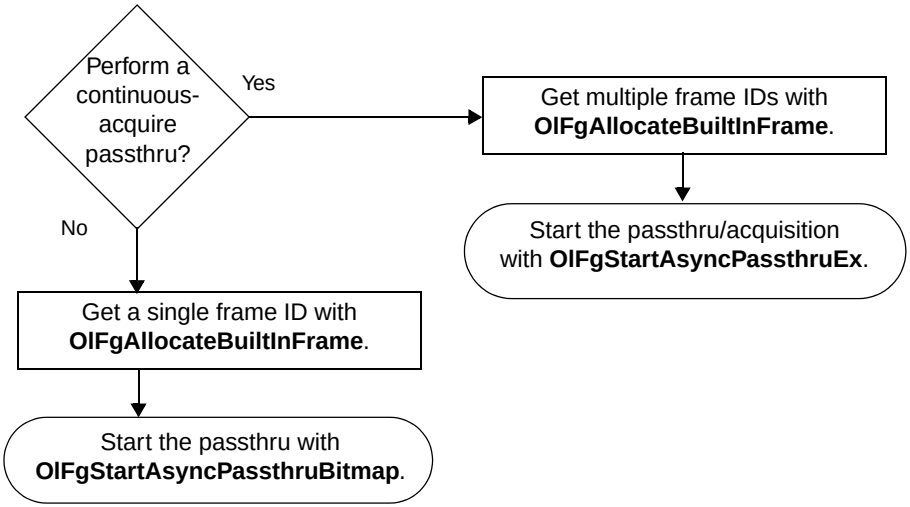
Process the Acquired Image (cont.)



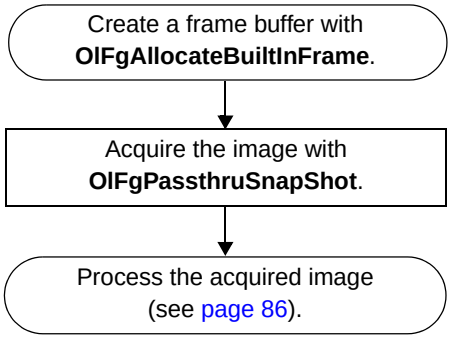
Process the Acquired Image (cont.)



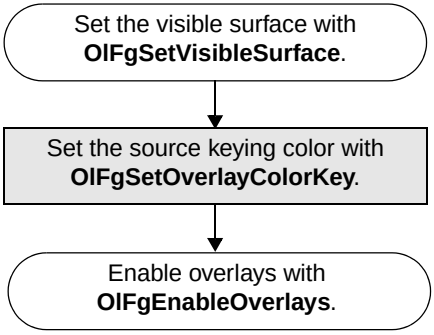
Start the Passthru Operation



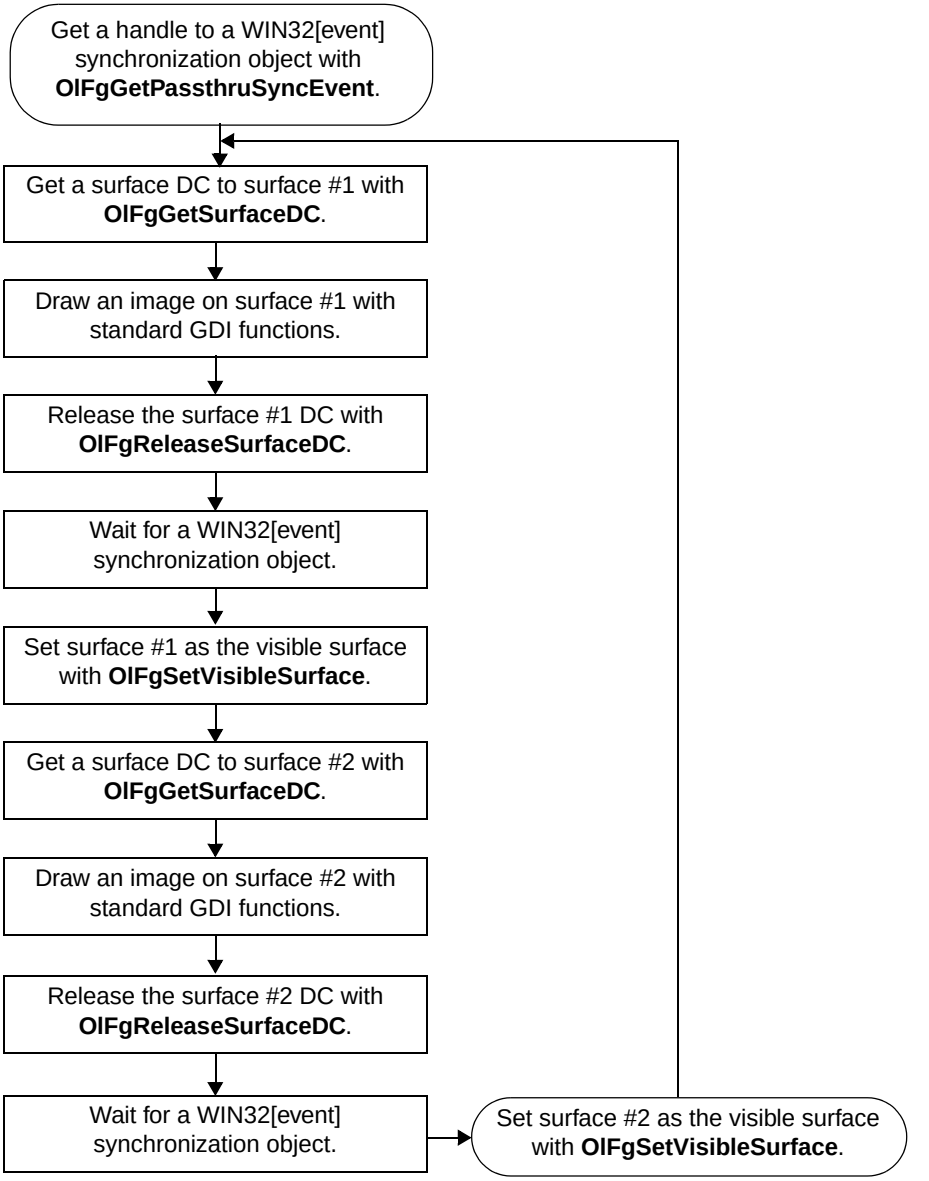
Take a Snapshot



Set up and Enable Overlays



Execute an Overlay Animation Sequence



Troubleshooting

General Checklist 94
Service and Support 98
If Your Board Needs Factory Service 102

General Checklist

Should you experience problems using the DT3130 Series board, please follow these steps:

1. Read all the documentation provided for your product. Make sure that you have added any "Read This First" information to your manual and that you have used this information.
2. Check the Imaging OMNI CD for any README files and ensure that you have used the latest installation and configuration information available.
3. Check that your system meets the requirements stated in the *DT3130 Series Getting Started Manual*.
4. Check that you have installed your hardware properly using the instructions in the *DT3130 Series Getting Started Manual*.
5. Check that you have installed and configured the device driver properly using the instructions in the *DT3130 Series Getting Started Manual*.
6. Search the DT Knowledgebase in the Support section of the Data Translation web site (at www.datatranslation.com) for an answer to your problem.

If you still experience problems, try using the information in Table 18 to isolate and solve the problem. If you cannot identify the problem, refer to page 98.

Table 18: Troubleshooting Problems

Symptom	Possible Cause	Possible Solution
Board does not respond.	The board is incorrectly aligned in a PCI expansion slot.	Check that the slot in which your DT3130 Series board is located is a PCI slot and that the board is correctly seated in the slot; see the instructions in the *DT3130 Series Getting Started Manual.*
	The interrupt level is unacceptable.	An interrupt conflict exists in your system. Since DT3130 Series boards require an interrupt for each device (up to three per board), you may experience interrupt conflicts with a peripheral device, such as a mouse. To resolve this problem, try using a serial mouse. If you think you may have an interrupt conflict between a PCI device and a device that is plugged into the ISA bus, change the interrupt setting (usually by changing a jumper) on the ISA device. If you think you may have an interrupt conflict on a PCI device that was not designed to share interrupts, select a different interrupt for each PCI slot in the PCI BIOS. To do this, enter the system BIOS program; this is usually done by pressing the DEL key when rebooting your system. Once in the system BIOS, enter the PCI/PnP BIOS setup, and select a unique interrupt for each PCI slot. The PCI BIOS assigns the interrupt; the device on the PCI bus does not have control over the interrupt assignment. Some network devices do not share interrupts. If you still have an interrupt conflict, remove the network device, install the DT3130 Series board, and reboot the system. Then reinsert the network device.

Table 18: Troubleshooting Problems (cont.)

Symptom	Possible Cause	Possible Solution
Board does not respond (cont.).	The board is damaged.	Contact Data Translation for technical support; refer to page 98.
Intermittent operation.	Loose connections or vibrations exist.	Check your wiring and tighten any loose connections or cushion vibration sources; see the instructions in the *DT3130 Series Getting Started Manual.*
	Electrical noise exists.	Check your connections; see the instructions in the *DT3130 Series Getting Started Manual.*
	The board is overheating.	Check environmental and ambient temperature; consult the board's specifications on page 106 of this manual and the documentation provided by your computer manufacturer for more information.
Data appears to be invalid.	Wiring is not connected properly.	Check your wiring and fix any open connections; see the instructions in the *DT3130 Series Getting Started Manual.*
Computer does not boot.	Board is not seated properly.	Check that the slot in which your DT3130 Series board is located is a PCI slot, that the board is correctly seated in the slot, and that the board is secured in the slot with a screw; see the instructions in the *DT3130 Series Getting Started Manual.*
	The power supply of the computer is too small to handle all the system resources.	Check the power requirements of your system resources and, if needed, get a larger power supply; consult the board's specifications on page 106 of this manual.

Table 18: Troubleshooting Problems (cont.)

Symptom	Possible Cause	Possible Solution
System lockup.	Board is not seated properly.	Check that the slot in which your DT3130 Series board is located is a PCI slot, that the board is correctly seated in the slot, and that the board is secured in the slot with a screw; see the instructions in the *DT3130 Series Getting Started Manual.*
	Interrupt level is unacceptable.	Since DT3130 Series boards require an interrupt for each device (up to three per board), you may experience interrupt conflicts with a peripheral device, such as a mouse. To resolve this problem, try using a serial mouse. If you think you may have an interrupt conflict between a PCI device and a device that is plugged into the ISA bus, change the interrupt setting (usually by changing a jumper) on the ISA device. If you think you may have an interrupt conflict on a PCI device that was not designed to share interrupts, select a different interrupt for each PCI slot in the PCI BIOS. To do this, enter the system BIOS program; this is usually done by pressing the DEL key when rebooting your system. Once in the system BIOS, enter the PCI/PnP BIOS setup, and select a unique interrupt for each PCI slot. The PCI BIOS assigns the interrupt; the device on the PCI bus does not have control over the interrupt assignment. Some network devices do not share interrupts. If you still have an interrupt conflict, remove the network device, install the DT3130 Series board, and reboot the system. Then, reinsert the network device.

Service and Support

If you have difficulty using the DT3130 Series board, Data Translation's Technical Support Department is available to provide prompt technical assistance. Support upgrades, technical information, and software are also available.

All customers can always obtain the support needed. The first 90 days are complimentary, as part of the product's original warranty, to help you get your system running. Customers who call outside of this time frame can either purchase a support contract or pay a nominal fee (charged on a per-incident basis).

For "priority support," purchase a support contract. Support contracts guarantee prompt response and are very affordable; contact your local sales office for details.

Refer to the Data Translation Support Policy located at the end of this manual for a list of services included and excluded in our standard support offering.

Telephone Technical Support

Telephone support is normally reserved for original warranty and support-contract customers. Support requests from non-contract or out-of-warranty customers are processed after requests from original warranty and support-contract customers.

For the most efficient service, please complete the form on page 100 and be at your computer when you call for technical support. This information helps to identify specific system and configuration-related problems and to replicate the problem in house, if necessary.

You can reach the Technical Support Department by calling (508) 481-3700 x1401.

If you are located outside the USA, call your local distributor. The name and telephone number of you nearest distributor are provided in your Data Translation catalog.

If you are leaving a message to request a support call, please include the following information:

- Your name (please include proper spelling),
- Your company or organization (please include proper spelling),
- A phone number,
- An email address where you can be reached,
- The hardware/software product you need help on,
- A summary of the issue or question you have,
- Your contract number, if applicable, and
- Your product serial number or purchase date.

Omitting any of the above information may delay our ability to resolve your issue.

Information Required for Technical Support

Name:_____Phone_____
Contract Number: _____
Address: _____
_____

Data Translation hardware product(s): _____
serial number: _____
configuration: _____
Data Translation device driver - SPO number: _____ _____
_____ version: _____
Data Translation software - SPO number:_____ _____
serial number: _____ version:_____
PC make/model: _____
operating system: _____ version:_____
Windows version: _____
processor: _____ speed:_____
RAM: _____ hard disk space:_____
network/number of users: _____ disk cache:_____
graphics adapter: _____ data bus:_____

I have the following boards and applications installed in my system:_____
_____
_____
I am encountering the following problem(s): _____
_____
_____
_____
and have received the following error messages/codes: _____
_____
_____
I have run the board diagnostics with the following results: _____
_____
You can reproduce the problem by performing these steps:
1. _____
_____
2. _____
_____
3. _____
_____

E-Mail and Fax Support

You can also get technical support by e-mailing or faxing the Technical Support Department:

- **E-mail**: You can reach Technical Support at the following address: tsupport@datx.com

  Ensure that you provide the following minimum information:

  – Your name,

  – Your company or organization,

  – A phone number,

  – An email address where you can be reached,

  – The hardware/software product you need help on,

  – A summary of the issue you are experiencing,

  – Your contract number, if applicable, and

  – Your product serial number or purchase date.

  – Omitting any of the above information may delay our ability to resolve your issue.

- **Fax**: Please photocopy and complete the form on page 100, then fax Technical Support at the following number: (508) 481-8620.

Support requests from non-contract and out-of-warranty customers are processed with the same priority as telephone support requests.

World-Wide Web

For the latest tips, software fixes, and other product information, you can always access our World-Wide Web site free of charge at the following address: http://www.datatranslation.com

If Your Board Needs Factory Service

If your board must be returned to Data Translation, perform the following steps:

1. Record the board's serial number, then contact the Customer Service Department at (508) 481-3700 (if you are in the USA) and obtain a Return Material Authorization (RMA).

   If you are located outside the USA, call your local distributor for authorization and shipping instructions. The name and telephone number of your nearest distributor are listed in your Data Translation catalog.
   All return shipments to Data Translation must be marked with the correct RMA number to ensure proper processing.

2. Using the original packing materials, if available, package the board as follows:

   – Wrap the board in an electrically conductive plastic material. Handle with ground protection. A static discharge can destroy components on the board.

   – Place in a secure shipping container.

3. Return the board to the following address, making sure the RMA number is visible on the outside of the box.

   Customer Service Dept.
   Data Translation, Inc.
   100 Locke Drive
   Marlboro, MA 01752-1192

Specifications

Table 19 lists the electrical specifications for the video input signals of the DT3130 Series boards.

Table 19: Video Input Electrical Specifications

Feature	Specification
Input Signal Range	0.5 V to 2.0 V
Input Impedance	75 Ω ± 10%
Anti-aliasing filters (optional) –3 db corner frequency	 7.4 MHz ±1 MHz

Table 20 lists the electrical specifications for the external trigger signals of the DT3130 Series boards.

Table 20: Input Electrical Specifications

Feature	Minimum Specification	Maximum Specification
Input Low Level (V_{IL}) Nonisolated Isolated	 0 VDC 0 VDC	 0.8 VDC[a] 0.8 VDC
Input High Level (V_{IH}) Nonisolated Isolated	 3.5 VDC 3.5 VDC	 5.0 VDC 32 VDC
Isolation voltage sustained for 60 s	250 VAC/DC	-
Pulse width (high or low level)	10 ms	-
Trigger rate	-	10 Hz[b]

Table 20: Input Electrical Specifications (cont.)

Feature	Minimum Specification	Maximum Specification
Reverse bias voltage (sustained)	-	10 VDC
Input resistance	–	3.3 kΩ typical

a. Exceeding the voltage limits noted may cause damage to the device to which the input is connected.
b. Hardware limitation only.

Table 21 lists the electrical specifications for the strobe output signals of DT3130 Series boards.

Table 21: Output Electrical Specifications

Feature	Minimum Specification	Maximum Specification
DT3131, DT3132, DT3133		
Low Output Voltage	0 VDC	0.4 VDC
High Output Voltage	2.4 VDC	5.0 VDC
DT3131-ISO, DT3132-ISO, DT3133-ISO[a]		
Output current	–	100 mA
Voltage across an output	–	60 VDC
Isolation voltage sustained for 60 s	250 VAC/VDC	–

a. Each strobe output is protected by a 300 mA polythermal switch.

Table 22 lists the power, physical, and environmental specifications of the DT3130 Series boards.

Table 22: Power, Physical, and Environmental Specifications

Feature	Specification
Operating temperature	0° C to 50° C (32° F to 122° F)
Storage temperature	-25° C to 70° C (-13° F to 158° F)
Humidity	0 to 90%, noncondensing
Dimensions	6.875 inches x 4.2 inches
Weight	5.3 ounces (150 grams)

Table 23 lists the specifications for the cables available for the DT3130 Series.

Table 23: Cable Specifications

Cable	Feature	Specification
EP311	P1 Connector	VGA style, D-sub, 15-pin (male), connector enclosure, 4-40 jackscrews, and shield (AMP 748473-1 or equivalent) Die-cast backshell with grommets (AMP 748676-1) Pin Contact (AMP 748333-5); need 6
	Cable type	75 Ω coaxial cable (Belden 9221 or equivalent); need 3 x 108-inches Heat-shrink tubing 1 x 12-inches and 3 x 1-inch
	Signal Connectors	Coax connector, 75 Ω, plug, crimp (AMP 413589-8); need 3

Table 23: Cable Specifications (cont.)

Cable	Feature	Specification
EP312	J1 Connector	VGA style, D-sub, 15-pin (male), connector enclosure and shield (AMP 748364-1 or equivalent) Zinc shell (NORCOMP 979-009-030-121) Pin Contact (AMP 748333-7); need 14
	Cable type	24 AWG; 9-twisted pair with drain 1 meter in length (Alpha 6014C-X). All wire drains should be connected to the metal shields at both ends of the cable.
EP312 (cont.)	Signal Connectors	J2 through J4 are DB9 female connectors (Norcomp 170-009-272-000); Socket (Norcomp 170-002-170-001); Zinc shell (Norcomp 979-009-030-121) J5 is a DB9 male connector (Norcomp 170-009-172-000); Pins (Norcomp 170-001-170-001); Zinc shell (Norcomp 979-009-030-121)

Table 23: Cable Specifications (cont.)

Cable	Feature	Specification
EP314	P1 Connector	VGA style, D-sub, 15-pin (male), connector enclosure, 4-40 jackscrews, and shield (AMP 748473-1 or equivalent) Die-cast metal backshell (Norcomp 979-009-030-121) Pin contact (AMP 748333-5); need 9
	Cable type	75 Ω coaxial cable (Belden 9221 or equivalent); need 9 x 24-inches Heat-shrink tubing (1 x 12-inch and 9 x 1-inch)
	Signal Connectors	Coax connector, 75 Ω, plug, crimp (AMP 413589-8); need 9
EP315	P1 Connector	4-position pin housing (AMP 1-480426-0) Pin contacts (AMP 61118-1); need 4
	P2 Connector	4-position pin housing (AMP 1-480424-0) Pin contacts (AMP 61117-1); need 4
	P3 Connector	2-position, 2 mm socket housing (Hirose DF3-2S-2C) 24-28 AWG socket contact (Hirose DF3-2428SC); need 2

Table 23: Cable Specifications (cont.)

Cable	Feature	Specification
EP315 (cont.)	Cable type	18 AWG, UL Style 1007 (red, black, and yellow) insulation (Belden 9918 or equivalent) 24 AWG, UL Style 1007 (black and yellow) insulation (Belden 9923 or equivalent)
EP317	J1 Connector	VGA style, D-sub, 15-pin (male), connector enclosure, 4-40 jackscrews, and shield (AMP 748473-1 or equivalent) Die-cast metal backshell (Norcomp 979-009-030-121) Pin contact (AMP 748333-5); need 4
	Cable type	2 meter
	Signal Connectors	4-pin, mini DIN male (standard S-video) connector

Connector Pin Assignments

Trigger Input/Strobe Output Connector J1 112
Video Input Connector J2 114
+12 V Power Connector P3 117

Trigger Input/Strobe Output Connector J1

Connector J1 is a 15-pin, male, D-shell connector that attaches the trigger input and strobe output signals to the board. You can access the signals using the EP312 cable or a user-designed cable. Figure 11 illustrates the pin locations of connector J1.

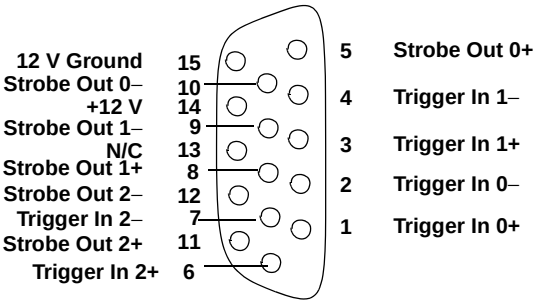


Figure 11: Trigger Input Connector - J1

Table 24 lists the pins of connector J1 by signal name and by the corresponding EP312 connector assignments, and describes these signals.

Table 24: J1 Pin Assignments

J1 Pin Number	EP312 Connector	EP312 Pin Number	Signal Name
1	Trigger	1	Trigger In 0+
2	Trigger	6	Trigger In 0–
3	Trigger	2	Trigger In 1+
4	Trigger	7	Trigger In 1–
5	Strobe 0	5	Strobe Out 0+
6	Trigger	3	Trigger In 2+
7	Trigger	8	Trigger In 2–
8	Strobe 1	5	Strobe Out 1+
9	Strobe 1	4	Strobe Out 1–
10	Strobe 0	4	Strobe Out 0–
11	Strobe 2	5	Strobe Out 2+
12	Strobe 2	4	Strobe Out 2–
13	Strobe 0 Strobe 1 Strobe 2 Trigger	2,3,7,8,9 1,2,3,6,7,8,9 1,2,3,6,7,8,9 5	No Connection
14	Strobe 0 Trigger	1 4	+12 V
15	Strobe 0 Trigger	6 9	12 V Ground

Video Input Connector J2

Connector J2 is a 15-pin, male, D-shell connector that attaches the video signals to the board. You can access three composite signals using the EP311 cable, nine composite signals using the EP314 cable, or one S-video signal using the EP317 cable. Figure 12 illustrates the pin locations for connector J2.

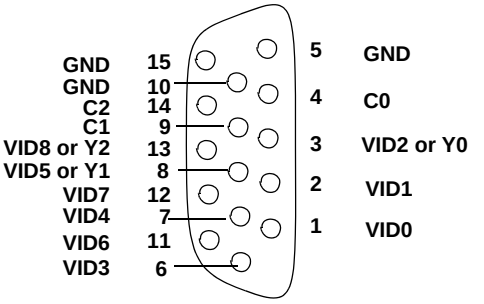


Figure 12: Video Input Connector - J2

Table 25 lists the pins of connector J2 by signal name and by the corresponding connector assignments of the EP311, EP314, and EP317 cables, and describes these signals.

Table 25: J2 Pin Assignments

J2 Pin	EP311 BNC Connector	EP314 BNC Connector	EP317 Pin Number	Signal Name	Signal Description
1	VID0	VID0	–	VID0	Composite Video Input Signal 0
2	–	VID1	–	VID1	Composite Video Input Signal 1
3	–	VID2	–	VID2	Composite Video Input Signal 2
	–	–	Pin 4	Y0	S-Video Luminance Signal 0
4	–	–	Pin 3	C0	S-Video Chrominance Input Signal 0
5	–	–	Pins 1 and 2	GND	Analog Ground
6	VID3	VID3	–	VID3	Composite Video Input Signal 3
7	–	VID4	–	VID4	Composite Video Input Signal 4
8	–	VID5	–	VID5	Composite Video Input Signal 5
	–	–	–	Y1[a]	S-Video Luminance Signal 1
9	–	–	–	C1[a.]	S-Video Chrominance Input Signal 1
10	–	–	–	GND	Analog Ground

Table 25: J2 Pin Assignments (cont.)

J2 Pin	EP311 BNC Connector	EP314 BNC Connector	EP317 Pin Number	Signal Name	Signal Description
11	VID6	VID6	–	VID6	Composite Video Input Signal 6
12	–	VID7	–	VID7	Composite Video Input Signal 7
13	–	VID8	–	VID8	Composite Video Input Signal 8
	–	–	–	Y2[a.]	S-Video Luminance Signal 2
14	–	–	–	C2[a.]	S-Video Chrominance Input Signal 2
15	–	–	–	GND	Analog Ground

a. Signals Y1, C1, Y2, and C2 are accessible only through a user-designed cable.

+12 V Power Connector P3

Connector P3 is a 2-pin connector that accepts +12 V (1.5 A) power from the host computer using the EP315 cable. The +12 V power is then routed to pin 14 (+12 V) and pin 15 (+12 V ground) of the J1 connector. This power is sufficient to drive up to three cameras. Figure 13 illustrates the pin assignments for connector P3.

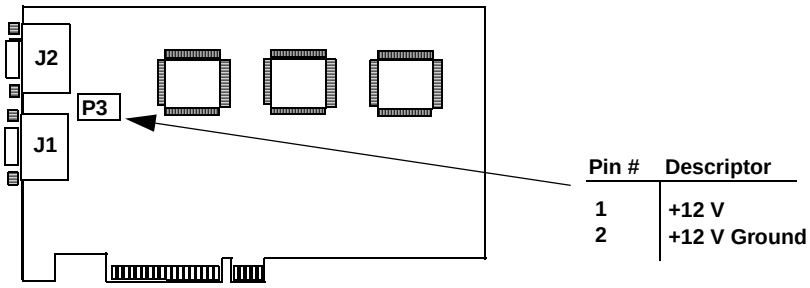


Figure 13: +12 V Power Connector - P3

Modifying the Device Driver

Windows 98 and Windows Me Procedures 120
Windows 2000 Procedures 123
Windows XP Procedures 126

Windows 98 and Windows Me Procedures

This section describes the following procedures in Windows 98 and Windows Me:

- Adding a board to the device driver configuration (on this page);
- Modifying the board settings in the device driver configuration (on page 121); and
- Uninstalling the device driver, if necessary (on page 122).

Adding a Board to the Device Driver Configuration

To add a new board to the DT3130 Series Device Driver configuration, perform the following steps:

1. Turn your computer off and insert the new DT3130 Series board into your computer following the instructions in the *DT3130 Series Getting Starting Manual*.
2. Turn your computer on and start Windows 98 or Windows Me.
   The Add New Hardware Wizard dialog box appears.
3. Click **Next**.
4. For Windows 98:
   Click **Search for the best driver for your device (Recommended)**, make sure all optional search locations are unchecked, then click **Next**.

   For Windows Me:
   Click **Automatic search for a better driver (Recommended)**.
5. Click **Next**.
   The files are copied.
6. Click **Finish**.
7. Open the Control Panel.
8. Double-click the **DT Imaging Control** icon.

9. Select the DT3130 Series device to configure.
   Note that the DT3131 and DT3131-ISO boards contain one device; the DT3132 and DT3132-ISO boards contain two devices; and the DT3133 and DT3133-ISO boards contain three devices. Device 1 corresponds to channels 0, 1, and 2; device 2 corresponds to channels 3, 4, and 5; and device 3 corresponds to channels 6, 7, and 8.
10. Select the **Video Format** as either 50 Hz or 60 Hz.
11. When you are finished, click **Done**.
    If you made any changes, the Save Changes dialog box appears.
12. If you want to save your changes, click **Yes**.

Modifying a Board in the Device Driver Configuration

To modify a board in the device driver configuration, perform the following steps:

1. Open the Control Panel.
2. Double-click the **DT Imaging Control** icon.
3. Select the DT3130 Series device to configure.
   Note that the DT3131 and DT3131-ISO boards contain one device; the DT3132 and DT3132-ISO boards contain two devices; and the DT3133 and DT3133-ISO boards contain three devices. Device 1 corresponds to channels 0, 1, and 2; device 2 corresponds to channels 3, 4, and 5; and device 3 corresponds to channels 6, 7, and 8.
4. Select the **Video Format** as either 50 Hz or 60 Hz.
5. When you are finished, click **Done**.
   If you made any changes, the Save Changes dialog box appears.
6. If you want to save your changes, click **Yes**.

Uninstalling the Device Driver

Generally, you will always require the DT3130 Series Device Driver. However, if you are no longer using the DT3130 Series with the supported software, you can uninstall the DT3130 Series Device Driver from the system by performing the following steps:

1. Open the Control Panel, and double-click **System**.
2. Click the **Device Manager** tab.
3. Double-click **DT Image Device**.
4. Click **DT3130 Series Secondary Device**, then click **Remove**. *The Confirm Device Removal dialog appears.*
5. Click **OK** to confirm the removal.
6. Click **DT3130 Series Frame Grabber**, then click **Remove**. *The Confirm Device Removal dialog appears.*
7. Click **OK** to confirm the removal.
8. Repeat steps 6 and 7 until all DT3130 Series frame grabber boards have been removed.
9. Close the System dialog box.
10. From the Control Panel, click **Add/Remove Programs**.
11. Click **DT3130 Series Drivers for Windows 98 and Me**, then click **Add/Remove**.
12. Click **Yes** to remove read-only files.
13. Click **Finish**.
14. Close the Control Panel.
15. Turn your computer off and remove any DT3130 Series boards.

Note: If you want to reinstall the device driver after removing it, refer to the *DT3130 Series Getting Started Manual* for instructions.

Windows 2000 Procedures

This section describes the following procedures in Windows 2000:

- Adding a board to the device driver configuration (on this page);
- Modifying the board settings in the device driver configuration (on page 124); and
- Uninstalling the device driver, if necessary (on page 125).

Adding a Board to the Device Driver Configuration

To add a new board to the DT3130 Series Device Driver configuration, perform the following steps:

1. Turn your computer off and insert the new DT3130 Series board into your computer following the instructions in the *DT3130 Series Getting Starting Manual*.
2. Turn your computer on and start Windows 2000.
   The Add New Hardware Wizard dialog box appears.
3. Click **Next**.
4. Click **Search for a suitable driver for my device (recommended)**, make sure all optional search locations are unchecked, then click **Next**.
5. Click **Next**.
   The files are copied.
6. Click **Finish**.
7. Open the Control Panel.
8. Double-click the **DT Imaging Control** icon.

9. Select the DT3130 Series device to configure.
   Note that the DT3131 and DT3131-ISO boards contain one device; the DT3132 and DT3132-ISO boards contain two devices; and the DT3133 and DT3133-ISO boards contain three devices. Device 1 corresponds to channels 0, 1, and 2; device 2 corresponds to channels 3, 4, and 5; and device 3 corresponds to channels 6, 7, and 8.
10. Select the **Video Format** as either 50 Hz or 60 Hz.
11. When you are finished, click **Done**.
    If you made any changes, the Save Changes dialog box appears.
12. If you want to save your changes, click **Yes**.

Modifying a Board in the Device Driver Configuration

To modify a board in the device driver configuration, perform the following steps:

1. Open the Control Panel.
2. Double-click the **DT Imaging Control** icon.
3. Select the DT3130 Series device to configure.
   Note that the DT3131 and DT3131-ISO boards contain one device; the DT3132 and DT3132-ISO boards contain two devices; and the DT3133 and DT3133-ISO boards contain three devices. Device 1 corresponds to channels 0, 1, and 2; device 2 corresponds to channels 3, 4, and 5; and device 3 corresponds to channels 6, 7, and 8.
4. Select the **Video Format** as either 50 Hz or 60 Hz.
5. When you are finished, click **Done**.
   If you made any changes, the Save Changes dialog box appears.
6. If you want to save your changes, click **Yes**.

Uninstalling the Device Driver

Generally, you will always require the DT3130 Series Device Driver. However, if you are no longer using the DT3130 Series board with the supported software, you can uninstall the DT3130 Series Device Driver from the system by performing the following steps:

1. Open the Control Panel.
2. Double-click **System**.
3. Click **Hardware**, then click **Device Manager**.
4. Double-click **DT Image Device**.
5. Click the **DT3130 Series Frame Grabber**, click **Action,** then click **Uninstall**.
6. Click **DT3130 Series Secondary Device**, click **Action,** then click **Uninstall**.
7. Close the System dialog box.
8. From the Control Panel, click **Add/Remove Programs**.
9. Click **DT3130 Series Drivers for Windows 2000**, then click **Change/Remove**.
10. If prompted, click **Yes** to remove read-only files.
11. Click **OK**.
12. Close the Control Panel.
13. Turn your computer off and remove any DT3130 Series boards.

Note: If you want to reinstall the device driver after removing it, refer to the *DT3130 Series Getting Started Manual* for instructions.

Windows XP Procedures

This section describes the following procedures in Windows XP:

- Adding a board to the device driver configuration (on this page);
- Modifying the board settings in the device driver configuration (on page 127); and
- Uninstalling the device driver, if necessary (on page 128).

Adding a Board to the Device Driver Configuration

To add a new board to the DT3130 Series Device Driver configuration, perform the following steps:

1. Turn your computer off and insert the new DT3130 Series board into your computer following the instructions in the *DT3130 Series Getting Starting Manual*.
2. Turn your computer on and start Windows XP.
   The Add New Hardware Wizard dialog box appears.
3. Click **Next**.
4. Click **Search for a suitable driver for my device (recommended)**, make sure all optional search locations are unchecked, then click **Next**.
5. Click **Next**.
   The files are copied.
6. Click **Finish**.
7. Open the Control Panel.
8. Double-click the **DT Imaging Control** icon.

9. Select the DT3130 Series device to configure.
   Note that the DT3131 and DT3131-ISO boards contain one device; the DT3132 and DT3132-ISO boards contain two devices; and the DT3133 and DT3133-ISO boards contain three devices. Device 1 corresponds to channels 0, 1, and 2; device 2 corresponds to channels 3, 4, and 5; and device 3 corresponds to channels 6, 7, and 8.
10. Select the **Video Format** as either 50 Hz or 60 Hz.
11. When you are finished, click **Done**.
    If you made any changes, the Save Changes dialog box appears.
12. If you want to save your changes, click **Yes**.

Modifying a Board in the Device Driver Configuration

To modify a board in the device driver configuration, perform the following steps:

1. Open the Control Panel.
2. Double-click the **DT Imaging Control** icon.
3. Select the DT3130 Series device to configure.
   Note that the DT3131 and DT3131-ISO boards contain one device; the DT3132 and DT3132-ISO boards contain two devices; and the DT3133 and DT3133-ISO boards contain three devices. Device 1 corresponds to channels 0, 1, and 2; device 2 corresponds to channels 3, 4, and 5; and device 3 corresponds to channels 6, 7, and 8.
4. Select the **Video Format** as either 50 Hz or 60 Hz.
5. When you are finished, click **Done**.
   If you made any changes, the Save Changes dialog box appears.
6. If you want to save your changes, click **Yes**.

Uninstalling the Device Driver

Generally, you will always require the DT3130 Series Device Driver. However, if you are no longer using the DT3130 Series board with the supported software, you can uninstall the DT3130 Series Device Driver from the system by performing the following steps:

1. Open the Control Panel.
2. Double-click **System**.
3. Click **Hardware**, then click **Device Manager**.
4. Double-click **DT Image Device**.
5. Click the **DT3130 Series Frame Grabber**, click **Action,** then click **Uninstall**.
6. Click **OK**.
7. Click **DT3130 Series Secondary Device**, click **Action,** then click **Uninstall**.
8. Click OK.
9. Close the System dialog box.
10. From the Control Panel, click **Add/Remove Programs**.
11. Click **DT3130 Series Drivers**, then click **Change/Remove**.
12. Click **Finish**.
13. Click **Close**.
14. Turn your computer off and remove any DT3130 Series boards.

Note: If you want to reinstall the device driver after removing it, refer to the *DT3130 Series Getting Started Manual* for instructions.

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